WONDER STORIES OF SCIENCE

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UNITED STATES OF AMERICA.

FROM DR. FRANKLIN'S BROOM-CORN SEED.

See Page 294.

WONDER STORIES

OF

SCIENCE

BY
Rev. D. N. Beach, Amanda B. Harris, Mary Wager-Fisher,
James L. Bowen, and others.

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BOSTON
D. LOTHROP & COMPANY
FRANKLIN AND HAWLEY STREETS

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HOW CHRISTMAS CARDS ARE MADE.

WHAT should we older folks have said if we could have had, when we were children, a Christmas card sent to us even like the least beautiful of those in the shop windows during the Christmas season.

In our time they probably had not so much as been thought of in this country. And it was not so *very*, *very* long ago either! Then a stocking-full of candy, a doll, a picture-book, a little wooden, or earthen, or sugar animal, a top, or any common toys — the list to select from was not long.

Now — everything! And, besides all the rest, these lovely Christmas cards — works from artist hands. Of course Christmas cards are for all ages and everybody. But the young people and the very little folks have certainly been most lavishly remembered. There are even whole series of baby cards, where babies are

seen doing all those pretty things which are thought so "cunning!" And for the five or six year-old lads and lassies there are the sweetest pictures ever made; and so on, all the way from the time of dolls, up.

Cards, cards: sent from house to house, loading down the mail-bags, distributed in hospitals, going over the seas, down into mines, and off to lonely cattle ranches and log-cabin homes; away back to the farthest western town, which in that period I spoke of had not even begun to be; and to distant colonies where then only savages were — wherever the mail-bag goes, there go they. And that is one of the pleasant things about them, next to their prettiness and cheapness. They can be so conveniently sent, and with no cost but a postage-stamp. No breakages either, as there might be to a porcelain vase, a carved bracket, a wax doll, or an elaborate toy. The cards are really the most available of all the tokens of good-will, at a time when everybody wants to send something to everybody else. And this is one of several reasons why they are so popular.

To know just how popular they are with all classes, you ought to wait at the counter or near the windows

of some store in one of the large cities just before Christmas. As that day approaches, these places fairly bloom out with cards. You would know the tempting show was spread, by the crowd hanging about from morning till night. Every one is a tip-toe to peep over his neighbors' shoulders, until you would think that the seeing and buying of Christmas cards were the great events of the season. And to some people they are. Now and then some forlorn-looking old woman or child-beggar comes with a few pennies to pay for one; and the transaction has all the importance to the purchaser that a transfer of railroad or bank stock has to some millionaire broker.

It was as good as reading a dozen story-books to stand one evening near the counter of a store where a brisk business in this line was going on, and watch those who were buying cards; to see their faces and hear what they said.

How those school-girls did "gush"! It was just "gush" — no other word expresses all that delicious babble and chatter, those extravagant expressions, those little ripples of talk. Everything was "too sweet," or "too lovely," or "too cunning for any-

thing." It was a "darling," or a "dear." And they were so long in deciding, and they were so good-natured!

"Oh, isn't this just the most charming thing? oh, isn't this splendid? oh, it is too perfect! It is — it is *exquisite!*" "*I* like this best!" "*This* is my choice! No. I can't tell! Oh, if they weren't all so pretty! How *am* I going to choose?" "Which do *you* like best? Oh, say, which *do* you?"

They were grammar-school girls who rattled away so — bright young girls with the rosy faces and sparkling eyes that we older people like to look at; and they had lovely Russia-leather porte-monnaies and glittering purses, and "lots of money to spend on Christmas cards."

As they lingered, and chattered, and admired, and selected, away up even to the dollar cards, they were jostled by an old rag-picker, wrinkled, skinny, brown as a gypsy, careworn and poverty-stricken; and then by a ragged bootblack and his comrade.

She held a dingy piece of scrip on which a faded figure five was barely visible; and she caught eagerly at a card adorned with a guady cherub, with wide-

ROOM

WHO MAKE
X-MAS CARDS

open mouth, as if it was the only one worth looking at. Exchanging the crumpled rag of money for it, she hurried off, her treasure extended at arms' length before her, as one would hold out a contribution-box.

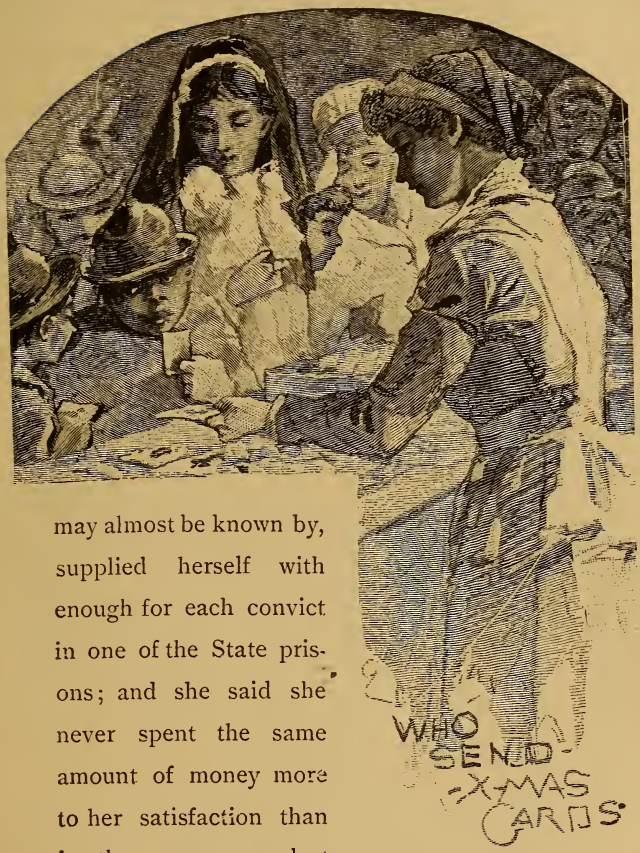
The boy clutched a silver dime, while he stood in what must have been an agony of indecision before two cards; and his companion sympathized with him. Our small polisher of boots was without a jacket; his trousers were patched, and so was his shirt; his auburn hair showed through a hole in his hat, and his bare toes could be seen in the yawning gaps in his boots. But he had a taste for the beautiful, and the two cards represented everything to be desired. He wanted both, but could have only one.

It was to be for Jessie; but whether Jessie was his small sweetheart, or sister, or neighbor, he did not tell. She was sick; and she was English, and her father had been a gardener, and he was dead; and he had been fond of violets, and she had always loved English violets best of all flowers. And this was a card of English violets, so freshly gathered, it would seem that you could almost smell their delectable

perfume. But the other card was a Kate Greenaway — a little damsel in a cap and flowered gown, with a green umbrella over her head. She had on red-heeled shoes, and she was walking in a garden; and she looked "like Jessie's sister that died that Jessie had not any photograph of." So, though the violets touched him nearly — poor, unkempt, rough-looking boy with the freckled face and red, chapped hands — his soul went forth to the little maid in the garden; and he turned his eager gaze first to one and then the other, till at last destiny interposed in the form of a friendly hand which slipped a dime into his other palm, while a voice whispered in his ear, "Buy them both."

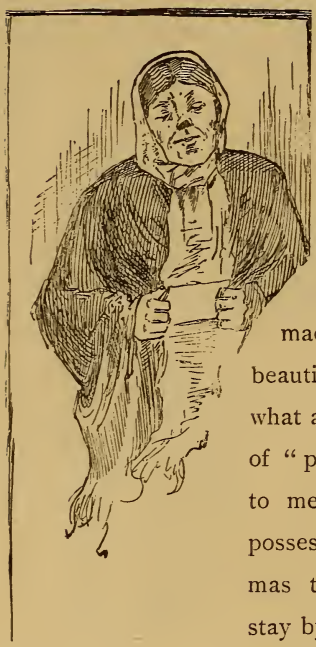
Then came a child who wanted one "cheap but lovely," for her father who was in the mines in Colorado; she had sent him one last year, and he had kept it stuck up over his bed ever since, and had looked at it every day and thought of her.

A sailor's wife bought a cradle scene for her husband off at sea; and a negro lad picked out a frog fiddling under a cat-tail, for his "old mammy at the Souf." A woman with one of those faces radiating benevolence, which the habitual doer of kind deeds



may almost be known by, supplied herself with enough for each convict in one of the State prisons; and she said she never spent the same amount of money more to her satisfaction than in the same way last year. She had picked out home pictures: children playing, a fireside group, a mother with her

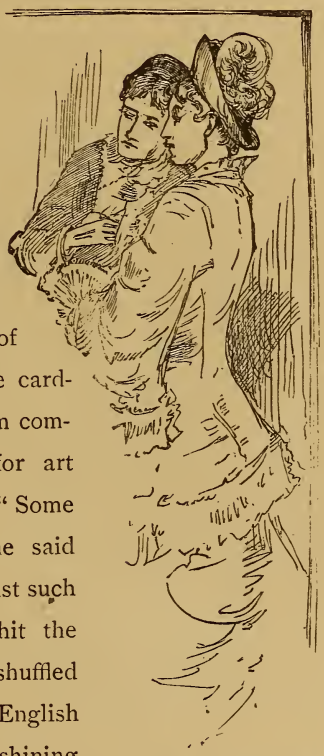
babe, and such things. And not a man but had done just what the miner did — put the card on the wall where he could see it the first thing in the morning.



It was cheering to observe how everybody, old or young, seemed under the power of that loving remembrance of *somebody;* and the very influence of such a spirit made the homeliest face beautiful. It is wonderful what a beautifier is that feeling of "peace on earth, good-will to men," which takes such possession of people at Christmas time. If it would only stay by!

Yet there were exceptions. Two stylish girls appeared, holding back their skirts, looking supercilious, disdainful, turning up their noses at those around them; and they inquired for "the latest

thing; something toney, you know." They did not want any of "*those* things, they are too common." "And why," asked one, "do you let such pretty things go so cheap that everybody can have them? It just spoils them."



TWO STYLISH GIRLS.

Whereupon the salesman quietly remarked that it was one of the leading ideas of the card-publishers to make them common, so that a taste for art should be educated. "Some of the best artists," he said "design and work on just such cards as these that hit the popular fancy;" and he shuffled over cherub faces, English landscapes framed in shining green holly, children singing Christmas carols, baskets of fruit and flowers,

birds, butterflies — everything that was attractive.

"Every year," he added, "people expect something prettier. Last year went beyond any other, and this year they are prettier than ever. By and by I am afraid the artists will exhaust their resources, but I hope not."

If you should ask a German where the custom of sending Christmas cards originated, he would tell you "in Germany." And he would point you to those, good, bad and indifferent, which are imported from his country, and would speak especially of the Hildersheimer cards, which are so well known among dealers. Hamburg is a famous place to order from; and everybody who is familiar with the display at the holiday season, knows whence come those mice and storks and frogs, and ridiculous blue-bottle flies, doing such funny things; those imps performing tricks; and the many with quaint interiors, and peasants in gay dresses. Some of these are appropriate to Christmas, but the most are only irresistibly comic and queer.

It was indeed an old German custom to remember friends with cards. But in other countries they have

long done the same. Not necessarily at Christmas, however. The Chinese, who know nothing of the meaning of such a day, have a fashion probably as old as their empire itself. In all the Chinese laundries among us are to be seen on the walls flaming red papers marked with black characters. These are the cards received on New Year, which remain there until the next anniversary comes round. Mr. Ko-

Kun-Hua, the mandarin at Harvard University, keeps up the national custom, and on our New Year's day (which is not the same as in China, sends his servant to the houses of his American friends, with handsome flowered cards inscribed in Chinese and English, with his good wishes, on the prescribed red paper, and carried in a red cloth.

The Japanese have caught the Christmas idea; and within the last year or two there have appeared many Japanese cards, rich in such designs as we see on vases, fans and cabinets. But most of those for sale are made where the beautiful "Pekin China" ware is made — in England. There are, however, places where the genuine things are to be had; Boston has one store which imports them directly from Tokio.

It is not difficult to distinguish the real article; for though the imitation may be cleverly done, no imitators can manufacture the peculiar paper of which the Japanese cards are made. The cards are of the ordinary oblong shape, or in scallops, or leaf forms, and each one shows that it was cut separately by hand. No two are just alike, and no two fit to-

gether. The designs are ingenious, as might be expected, and the colors have a peculiar richness such as our artists cannot give. In every one of the pictures there are some little bits which do not at first catch the eye. For instance, on one of the superbly painted branches of flowers may be discovered a frog, holding fast by one arm while with the other he reaches a fish-line as far out as he can, to catch a crab in the water below. In another a spider is offering a fan to a bird; a fly up in a tree has a lantern, which he is letting down to a young bird on the back of an old one; and a grasshopper is trying to overtake one of his comrades to hold an umbrella over his head. In every one there is some little by-play of this kind.

If you were to ask an Englishman where this great card movement started, he would probably tell you in his country, from the fact that cards have for several years been in use there as Christmas tokens. But there was nothing of any special account, or of any artistic value, either there or anywhere on the other side of the water, until Mr. Louis Prang put his energies into the work.

It will have to be claimed, then, in some sense, as among "Boston notions;" and he must have the credit of its development.

He started in a very modest way, about seven years ago, with floral cards on a black ground — a great many of you have some of the identical cards stored away among your souvenirs. And very handsome they are too: such natural scarlet geraniums, such perfect daisies, and sprays of apple-blossoms on the solid background of black! They are by no means to be disparaged, though the business has made such astonishing progress since. The work had the same qualities of thoroughness and fidelity then as now.

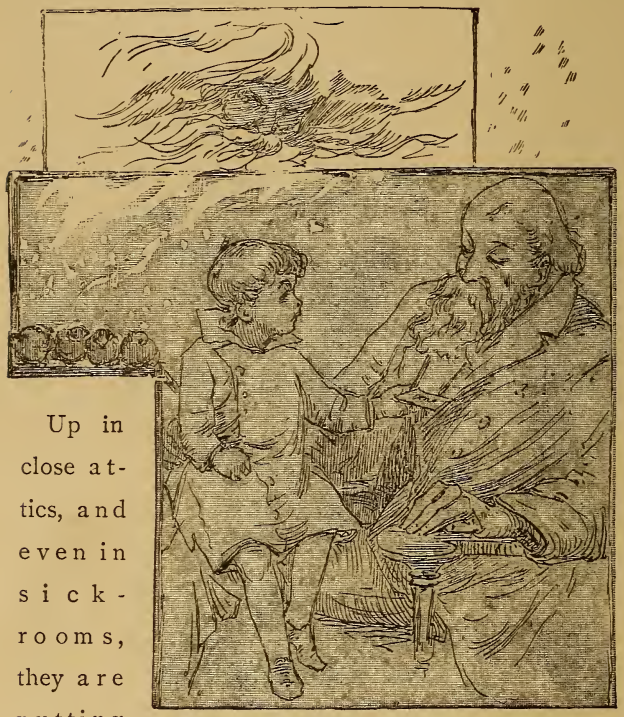
Such was the small beginning. But they "took" at once. He introduced them into England (the first of the kind ever seen there), without any name, and they were known in the market simply as "American cards." They immediately became popular; perhaps more so there and elsewhere in Europe than here. And for the same reason they have kept their hold. In Europe all classes love flowers. In Germany every villager has his bit of

flower garden — if he has the means, a small conservatory; at any rate, his window plants. In England it is the same. The London dressmakers who have only an humble dark room, invariably have a few pots of flowers in their window. To such people these cards appealed.

And Mr. Prang's flower cards are called the finest in the world. He now has persons employed on them who are not only artists, but botanists; and the pictures they produce are as beautiful and faithful as skill and study can make them. These re productions are only chromos, it is true, but are the most careful copies of excellent work. Nothing but the original hand-painted piece can surpass them.

Cards painted by hand must always command a price too high for the purses of the many, and any considerable demand for them could not be met. As it is, several of our publishing houses employ their own artists on the preparation of these choice things, which are often done on ivory, or mounted on the finest board or on a lustrous back of satin. Among the artists whose names do not appear, are women who do this for their daily bread, drawing and coloring

from life our field and garden flowers. There are touching histories of some whose patient hands are busy over this dainty employment.



WHO RECEIVE CHRISTMAS CARDS.

Up in close attics, and even in sick-rooms, they are putting the lovers of beautiful forms under obligation to them for those

groups of delicious lilies, the wild roses, the blood-red cardinal flowers and golden-rod; the very sight of which in the shop windows brings up memories of rambles in the country, and the glory of summer days.

WHO RECEIVE CHRISTMAS CARDS.

Specialties in Christmas cards each year make their appearance, beginning in price at two cents

and ranging up to a dollar or more. But those from ten or fifteen to twenty-five cents have the widest sale. One house brings out an imitation birch-bark card with rustic design; another in screen form, with Japanese scenes; leaflets, panels, heavy cards with India-ink borders, or a gilt or silver back-ground; a novelty if possible.

About two years ago the Boston firm of S. W. Tilton & Co. issued a series of "Outline Design Cards" for studies and decorative purposes, which have met with a good deal of favor. The work was by Miss Burlingame. They are graded and are furnished in packages of six, together with a set of colors, and directions for using, so that any ingenious girl, even a child, can paint her own cards. The first is very simple, but an extremely pretty thing. A little girl in a sort of Mother Hubbard cap, a trig coat with big pocket and buttons, a kerchief pinned round her shoulders, huge muff in one hand and stick in the other, is starting off on a journey, reminding one of Jeanie Deans trudging on foot up to London. In the order of progression, the designs become more difficult; and such animated

and absurd scenes appear as a snow landscape with a polar bear bowing like a dancing-master, while he pays the compliments of the season to three penguins.

Of the imported cards, those most familiar are the De La Rue, the Kate Greenaway, and the Marcus Ward. The De La Rues are delicate and mellow, rather than original or vigorous. They are apt to represent figures of tall, slender-limbed young women in soft drapery, and the colors have a kind of Pompeiian richness. They are dreamy-looking and æsthetic; and there is a satiny softness about the finish which gives to all of them the same general characteristics.

The Kate Greenaway cards belong with the age where nursery rhymes are a delight. Everybody knows now her old-fashioned little folks, with their distractingly pretty, quaint clothes. She, too, usually has human figures, but hers are children. Those small boys and girls, working in the garden, going to market, off on a holiday, walking in the fields, tending dolls, out under umbrellas, playing at housekeeping, doing everything that their elders do, in such a wise, odd way, in such sober mimicry, such

make-believe — who does not know and admire them?

The Marcus Ward cards are spoken of as English, but they are really produced in Ireland. The paper-mills and lithographic establishment of the firm are in Belfast, though scarcely an Irishman is to be found on their staff of artists and designers, but mostly English and Germans. Their cards come both in the single form and in the folded, where you have a whole series opening in panels. Some of the heads and landscapes are exquisite, appearing to have been copied from distinguished artists; and the card itself is often of finish so choice that no other surpasses it.

The three kinds, with the Hildersheimers from Germany, make the leading lines from Europe.

But we must come back to the greatest card enterprise in the world — that of Mr. Prang, which has grown like the famous bean-stalk of the story-book. His heart was in it from the first, and he had ideas of his own: the main thing was to get artists who would work them out. A better class of these began to come into the service, and within the last two or

three years some of the best have tried their hand. More still have become practically interested during this last year, for he has doubled his previous amount for prizes, offering $4000.

The competition for prizes gave a great start to the business everywhere. It had long been in his mind, and he only waited until he felt sure that there would be artists enough to compete to make it worth while. The offer made in the spring of 1880 was the first of the kind ever made by anybody. Since then, Raphael Tuck in England has followed his example.

For the prizes of $1000, $500, $300 and $200, nearly seven hundred designs were sent in, of which, besides those of the successful competitors, he bought about twenty-five, which will be brought out at some future time.

These prize cards have been so many times described that it need only be said that the first, by Miss Rosina Emmett, was a group of choir boys singing a Christmas anthem, and the accessories of an angel announcing the glad news to a shepherd. The stars and passion-flowers were introduced with admi-

rable taste. The next, by Alexander Sandier, had no religious idea, but represented a little girl in much scarlet and white fur, kissing her finger-tips to you, while she gives good wishes; and it is very sweet and winning.

These two may be taken as types of the two distinct classes of cards which began to divide public favor, crowding a little upon the floral cards which had hitherto held the market.

In the second competition, Mr. Prang paid the same sum in prizes again, and a new feature was developed; namely, a Christmas card of a character so distinctively artistic that it would answer just as well for a panel, or a wall picture, as for the holiday occasion. The design which won the first, has been much criticised, as wanting both in the religious element and in any fitness to Christmas. But as indicating another phase in the card enterprise, it is artistic in every respect.

About twenty-five hundred designs were offered in the second competition, though not by that number of individuals, some artists sending more than one. Of this list, fifteen hundred, more or less, were re-

jected by the judges, and the others were placed on exhibition. Mr. Prang bought only fifteen or twenty.

It was one of the noticeable things, that nearly all had human figures; and as it takes an artist to draw a figure, there were lamentable failures. In many, otherwise commendable, the design was so complicated that the eye did not catch the meaning — one had to ask what it was. Others would have been well enough in their place, but were out of place there.

It was pitiable to see how many people without talent or taste, dared to compete for a thousand-dollar prize. One old lady of seventy was sure she should get it; but after experimenting with a picture, her aspirations came down to the second, and then she applied to a professional artist to touch it up for her.

There were the most crude and also the most absurd things offered. Angels with wings heavy enough to drag them to the earth; strange mixtures of things ancient and modern; a bust of Cæsar Augustus; a Holy Family with the Star-spangled-

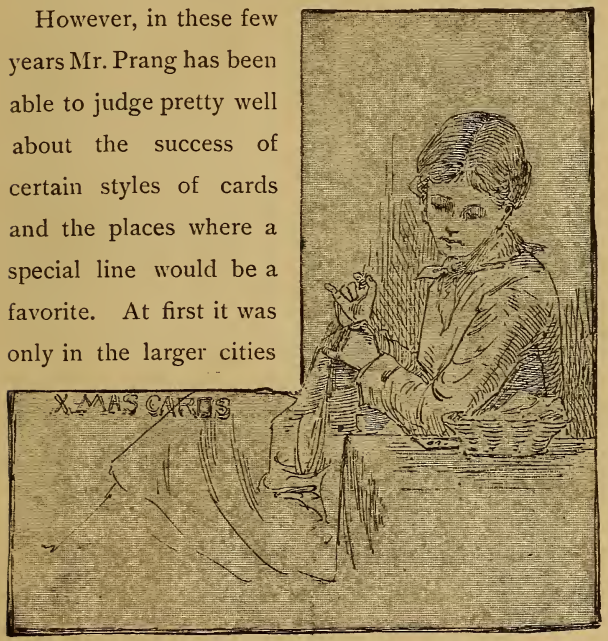
banner in the background, and General Garfield on his way to the White House.

WHO APPRECIATE CHRISTMAS CARDS.

In the third competition a double set of prizes will be awarded; the first will be decided by a vote of artists and critics, the second by the direct vote of the people. At this date — the date when this article goes into type — the drawings of this third competition are on exhibition in New York city. About fifty of the seven hundred designs which were sent in, have been selected for the display. Each design is numbered before it is hung in the gallery, and every visitor is

invited to write the number of the drawing which has pleased him most, on a slip of paper, and deposit it in a box before he leaves. In this way Mr. Prang, always painstaking and conscientious, hopes fully to gauge the popular tastes, and to give the people the cards that they best like.*

However, in these few years Mr. Prang has been able to judge pretty well about the success of certain styles of cards and the places where a special line would be a favorite. At first it was only in the larger cities



*The Prizes have been awarded; and it will interest our readers to know that the Second and Third Artists' Prizes went to the lady who illustrated this article, Miss L. B. Humphrey.

that there was much demand for them. Now the orders come from every direction; and last year the sales of this house alone were over five millions.

A visit to his establishment in Roxbury, as the holiday time draws near, will give one an idea of the magnitude to which the Christmas-card business has grown.

It takes three months to get one of those pictures through all the processes. In one long room a row of artists, each in his own little nook, at his own window, is busy over something beautiful, tracing it by means of the sheet of gelatine, perhaps. Designs are constantly coming in. Mr. Prang is prepared to take the best from any part of the world. They arrive from London, Berlin, Munich, Dresden; and one lady has sent good work from county Galway, lately associated with land-leaguers and "Boycotting."

In different departments the presses are going, and sheets of cards are being taken off and passed on for some further development. They go through processes enough fully to bewilder the looker-on before they come out in their finished state.

Fifty or sixty girls occupy the packing-rooms,

CHRISTMAS CARDS IN STATE PRISON.

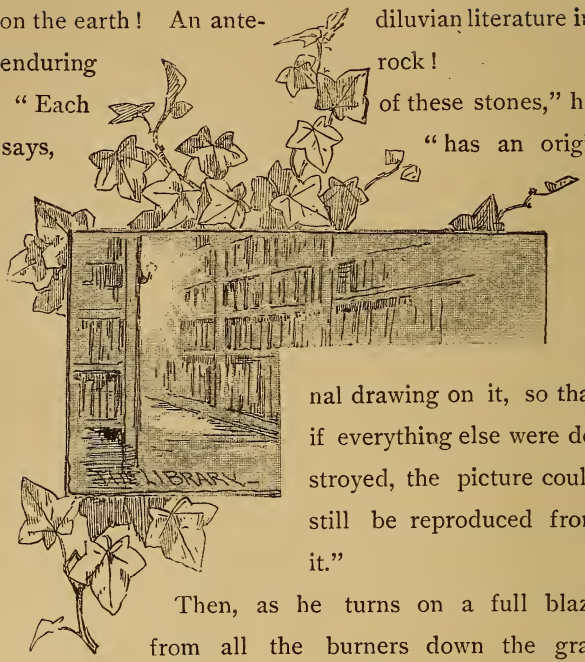
putting the cards in boxes, or otherwise preparing for sending them off on their short or long journeys — perhaps to the nearest city, perhaps to an agent in Australia. And it is difficult to make one's way through and out of the bustling place.

Then, when you have been to the machine shop, and have seen in rough a huge sample of the stone — a kind of limestone with some clay in it, which comes from a deep quarry in Germany — which is so important in this great business, you are invited by Mr. Prang to "the Library."

You are conducted by him down to the basement to a cellar-like quarter, wholly foreign to any purpose or likeness of a library. In the dimness you can discern nothing that looks like a book. You are at the entrance of a half-subterranean passage, scarcely wide enough for you to walk in, and stretching off in gloomy, chill perspective. But when he lights the gas, you see that it is lined with tablets of gray stone, each on its own individual shelf, laid up with the order of masonry. Like petrified volumes in solid folio, weighty, austere, left over from some age when there were giants

on the earth! An ante-diluvian literature in enduring rock!

"Each of these stones," he says, "has an original drawing on it, so that if everything else were destroyed, the picture could still be reproduced from it."



Then, as he turns on a full blaze from all the burners down the gray vista, he puts the question, with a twinkle of merriment in his eye, — "And what do you think of the Library?"

A PAIR OF GLOVES.

JOHNSTOWN, N. Y., is a picturesque and interesting old village, connected as it is with the life of Sir William Johnson, of pre-Revolutionary fame, the hero of many a battle, the friend of the red men, and the promoter of civilization in a new country. His baronial-like residence, the Hall, with its lawns and old-fashioned flower-gardens, is near the village, and still in excellent preservation. About the time of Sir William's death in 1774, or a year or two later, an industry was begun here which was destined to rule the town in its trade, and which has now become gigantic in its proportions.

Accounts of the origin of the glove business in Johnstown and its vicinity are not very reliable; but it is probable that one Tallmage Edwards, an Englishman, taught the art to Edward O. Mills, a person who was sent from time to time to Holland to buy

wheat, and while there purchased skins. Out of these foreign skins, gloves and leather mittens were made, on a small scale, and pedlars on foot carried them into the Mohawk Valley, and sold them or exchanged them for deer skins. Later the art of dressing all kinds of skins suitable for glove-making was brought here, and from the manufacture of a few dozen pairs every year, hundreds of thousands of pairs are now made within the same period. The business seems to have taken possession of the entire village, and strikes a stranger with some peculiar aspects. Sign-boards in every part of the village, even in the streets of private residences, advertise it, and a large proportion of the people met in the public thoroughfares are carrying gloves or mittens, made or unmade, to or from the factories; while everywhere in the outskirts of the town the odoriferous products of the skin-mills are flapping over trellises in the wind to dry. Curiosity led us into one of the larger establishments where all kinds of gloves and leather mittens are manufactured, where we witnessed the whole process, and talked with some of the operatives about their unique trade.

The building is on the prettiest streets in the town, and, save for the whirr of sewing-machines heard through the open windows, might be taken for a private residence.

We were escorted through the different departments by the forewoman. She is a German girl who learned her trade in Berlin, has made gloves in Paris, and is familiar with the whole routine.

"Ah, yes," she said quaintly, "I will tell you all about it, though you must ask me some questions. First, you know the best skins for making gloves come from Europe, Mexico, Central and South America. The skins cured here are but for the coarser kinds of gloves."

"You have, then, nothing to do with the skins before they are made up?"

"Not to color or to dress them, but they are scraped here. Come you this way."

She took us to a room where a dozen men were standing before high tables. Each had a skin of some kind, sheep, calf, or goat, stretched out before him. Each had a bowl of flour, and a kind of broad chisel which he dipped in the flour and then vigor-

ously scraped with it the wrong side of the skin.

"This process," said Annie, "is to make thin the leathers and pliable. The flour makes soft the skin, and keeps from slipping the knife."

Then she took us to another room where these scraped skins were cut by machinery into blocks or square pieces, the exact length and width of certain sizes of gloves and mittens. "You see?" said our guide.

Yes, we saw; the skins, two or three thicknesses at a time, after being laid under a cutter, were chopped square in an instant.

"Exactly," said Annie. "It is all exactly. You here now see this the second method; the third method, too, is made here."

And now we were led to a third room where a young man stood before a machine that looked like a printing press. Beside him, on a table, were heaps of the square-cut skins. He showed us, at a sign from Annie, a square box open on one side, in which was a shining steel outline of a hand. On this outline or shape he now laid six squares of skin, and slipping a cover on the box, placed it on the top of

the queer-looking machine, fixing it very squarely and evenly. Then he seized a string which held the handle of an upper arm, pulled this arm with its two big iron balls, one at either end, twisted it one side, then gave it a sharp, sudden turn twice, each time a soft distinct thud being heard.

"Now you are to look," said Annie.

The young man again fastened the handle of the cutting-machine; then he took out the box. He was obliged to open it with a hammer, the top had become so fast. There in the box lay the entire glove, cut as smoothly and evenly and perfect in shape as if done by the most dextrous scissors — six of them. Each part of the six gloves was complete; the hand, the fingers, the thumb isolated and by itself, with the little gusset on the under side of the thumb-piece, and the strips that go between the fingers.

"See!" said Annie, "it is exactly."

The workman quickly took out and laid aside the six gloves, and repeated the operation with another set of six skins.

"Are all your gloves cut by machinery?" we asked.

"All, save those made to private orders, where the

hand is all over carefully measured, and the skin cut with the scissors. Now see again. From the cutting-machine — and you like to know that all gloves made for the general trade in Europe are cut in the same way — must be taken out all the shavings, the little scraps that are waste. This is done by other workmen. Then pairs are carefully sorted to each other, and laid together and marked. Then they are placed in the closet ready to be made up."

"Are they all made here?"

"Oh, no, no, no! they are carried to the private houses — by the dozens of pairs — all the persons taking them away having theirselves a book in which the number taken and returned are registered. We make only the best qualities here, and it is I who give them out to be made. Now come up-stairs."

The buzz of sewing-machines was audible all over the building; and no wonder, since the second story was entirely occupied by girls making different kinds of gloves.

"Are all the machines alike? And are all gloves sewed by machine? French gloves are sewed by hand, are they not?" we asked.

"There are several kinds of machines used in glove-sewing — some of French invention, some of your American. The over-sewers are all French; but no, no; not any gloves are sewed now by hand. Here our finest gloves are made."

She led us to one side of the long room, where half a dozen girls sat each before a peculiar-looking machine, its needle turned sidewise instead of being in a horizontal position. This process seemed a dainty one. On each machine lay a pile of soft dark skins, cut and ready for manufacture. The machine was (in this instance) threaded with white silk, two spools. The operator picked up a glove and folded it together — as you know from the lower part of the thumb to the wrist it is cut whole — and began the outside seam, a diminutive hook letting down the silk, the needle catching it, and thus the beautiful even over-seam of the glove was made. When she reached the top of the little finger, the operator paused, and picking up a pile of small slits of kid, selected one and inserted it in the seam she was sewing. If you will examine a kid glove, this insertion of the slit or gusset between the fingers will be understood.

Down then she went with the seam to the inside of the little finger; and so on up and down fingers, until she reached the top of the fore-finger, where she turned and went back to complete the outer seams of the gussets till the top of the little finger was again reached. The sewing of the thumb-piece and thumb-gusset was an after-process.

"Now she has done her part of the glove, and exactly," remarked the forewoman.

"How many pairs does she sew in a day?"

"I think she and all the smart girls can sew six or seven dozen pairs in a day. The stitching on the back of the glove is made by another machine."

The next group of sewers made a different seam in the gloves — a flat seam. It was stitched by another kind of machine; and there were still other kinds, all for fine gloves for gentlemen and ladies' wear. The finishing at the top, whether of binding, pinking, or with gauntlets, was all done by separate workwomen, as well as the putting on of buttons and fastenings. Thus a completed glove has passed through the hands of five or six persons before it is folded and packed for sale.

"How many kinds of gloves do you make?"

"Oh, so many!" said the forewoman. "There are heavy gloves for the warmth, both gentlemen's and ladies'—coarse, thick affairs they are; there are the driving-gloves, the gauntleted gloves and the visiting gloves; then there are leather mittens, lined with the woollen and topped with the fur, and the castor glove, and all the undressed-leather gloves of both yellow and black. Ah, they are many gloves!"

"Where do they send these gloves?"

"All over the United States."

"Have you any idea of the amount of the general trade of this town in gloves?"

"I have heard it that it is about two hundred thousand dozen pairs in the year, but I think the number is the more."

"How much does the ordinary glove-maker earn per week?"

"From ten to fifteen dollars; some earns the twenty; but usually they get forty dollars in the month, and the demand for the labor is greater than the supply. Little girls that do nothing but tie the ends of the threads on the coarser kinds of gloves

can earn fifteen dollars per month — ah, it's the good business. It is not the heavy kind. It makes no back to ache!"

"How many domestic skins are cut up in Johnstown during the year, do you suppose?"

"Something like twenty thousand are made ready here in or near the village."

Later we learned the process of preparing the skins. The domestic, that is, the American skins of different kinds, and the imported, both "in the raw," are placed in a cask, seventy-five or eighty at a time, to receive a salt pickle; they are then washed and placed in an alum bath, in which they remain twelve hours. Then they are stretched by a thin, round-faced iron, to remove wrinkles, and then are fastened to a frame to dry, either in the sun or by steam. They are next sorted for coloring, the best being reserved for the lighter shades. Again they are washed and put in an egg bath, the yolk alone being used. One mill has thus consumed six thousand dozens of eggs during the present year. After the egg bath, the skins, being now a pure white, are laid flesh-side down on zinc or lead tables, and brushed

over with liquid dyes composed of wood, citron, red-wood, lignum-vitæ, Brazil bark, etc., according to the colors desired.

"Is this the final process?" we asked.

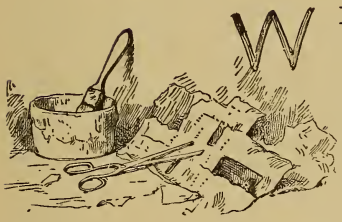
"Oh, no," said the proprietor of the mill. "The color must be 'set,' and for this purpose a 'mordant' of some kind is used — that is, the skins must be brushed with a preparation of alum, copperas and blue vitriol, again dried, then dampened and rolled up in separate parcels, flesh-side out, and packed in barrels to season; that is to render every part alike, and equally soft and pliable. After the seasoning, they are shaved; that is, a sharp knife is passed over the flesh side, and every little bunch or superfluous particle is removed, making the surface smooth and soft. The last process is to polish the grain side of the skin with a pad made of flannel, making it still softer and more pliable and ready for manufacture. The finest white skins are reserved for white gloves, and are rubbed and re-rubbed with the flannel pad."

"What a slow process!"

"Yes, and one requiring great care. Deer skins

are the most difficult to prepare, and the tanning is somewhat, but not essentially different, save in the smoking to which they are subjected. They are placed in a smoke-house to dry, the smoke also darkening them. Oh, there's *work* in it, plenty of work, hard work, careful work, puttering work; but it's a good business, and an enduring business. Fact, we here think we've about as good as there is! Certainly it is a prosperous town."

HOW NEWSPAPERS ARE MADE.

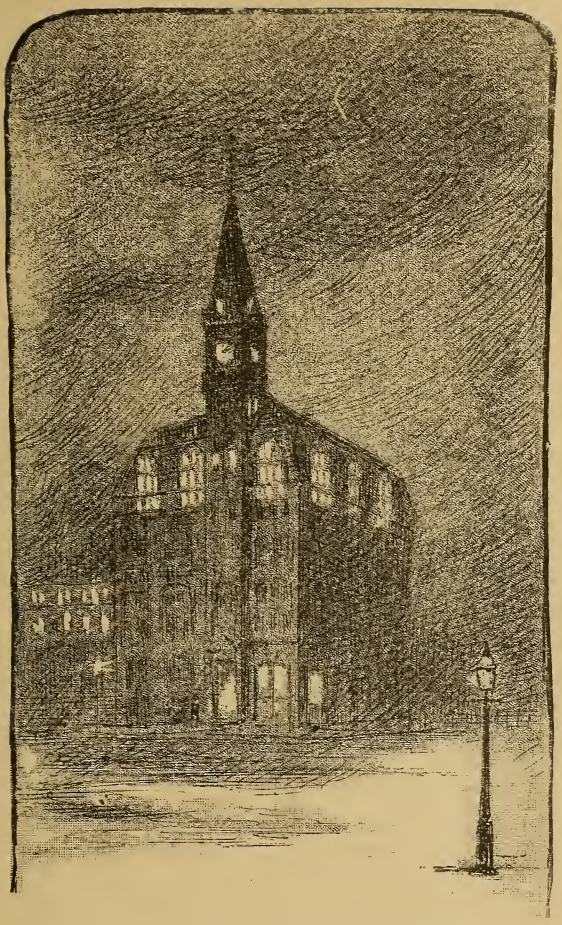


WE will suppose that it is a great newspaper, in a great city, printing daily 25,000, or more, copies. Here it is, with wide columns, with small, compact type, with very little space wasted in head lines, eight large pages of it, something like 100,000 words printed upon it, and sold for four cents — 25,000 words for a cent. It is a great institution — a power greater than a hundred banking-houses, than a hundred politicians, than a hundred clergymen. It collects and scatters news; it instructs and entertains with valuable and sprightly articles; it forms and concentrates public opinion; it in one way or another, brings its influence to bear

upon millions of people, in its own, and other lands. Who would not like to know something about it?

And there is Tom, first of all, who declares that he is going to be a business man, and who already has a bank-book with a good many dollars entered on its credit side — there is Tom, I say, asking first of all: "How much does it cost? and where does the money come from? and is it a paying concern?" Tom shall not have his questions expressly answered; for it isn't exactly his business; but here are some points from which he may figure:

"*How much does it cost?*" Well, there is the publishing department, with an eminent business man at its head, with two or three good business men for his assistants, and with several excellent clerks and other employès. Then there is the Editor-in-Chief, and the Managing Editor, and the City Editor, and a corps of editors of different departments, besides reporters — thirty or forty men in all, each with some special literary gift. Then there are thirty or forty men setting type; a half-dozen proof-readers; a half-dozen stereotypers; the engineer and foreman and assistants below stairs, who do the printing; and several men employed in the mailing department. Then there are tons and tons of paper to be bought each week; ink, new type, heavy bills for



THE N. Y. TRIBUNE BUILDING AT NIGHT.

postage; many hundreds of dollars a week for telegraphic dispatches; and the interest on the money invested in an expensive building; expensive machinery, and an expensive stock of printers' materials — nothing being said of the pay of correspondents of the paper at the State Capitol, at Washington, at London, at Paris, etc. Tom is enough of a business man, already, I know, to figure up the weekly expenses of such an establishment at several thousands of dollars — a good many hundreds at each issue of the paper.

"*And where does the money come from?*" Partly from the sale of papers. Only four cents apiece, and only a part of that goes to the paper; but, then, 25,000 times, say two-and-a-half cents, is $625, which it must be confessed, is quite a respectable sum for quarter-dimes to pile up in a single day. But the greater part of the money comes from advertisements. Nearly half of the paper is taken up with them. If you take a half-dozen lines to the advertising clerk, he will charge you two or three dollars; and there are several hundred times as much as your small advertisement in each paper. So you may guess what an income the advertising yields. And the larger, the more popular, and the more widely read the paper, the better will be the prices which adver-

tisers will pay, and the more will be the advertisements. And so the publisher tries to sell as many papers as he can, partly because of the money which he gets for them, but more, because the more he sells the more advertising will he get, and the better rates will he charge for it. So, Tom, if you ever become the publisher of a newspaper, you must set your heart on getting an editor who will make a paper that will sell — whatever else he does or does not do.

"*And is it a paying concern?*" Well, I don't think the editors think they get very large pay, nor the correspondents, nor the reporters, nor the printers, nor the pressmen. They work incessantly; it is an intense sort of work; the hours are long and late; the chances of premature death are multiplied. I think they will all say: "We aren't in this business for the money that is in it; we are in it for the influence of it, for the art of it, for the love of it; but then, we are very glad to get our checks all the same." As to whether the paper pays the men who own it — which was Tom's question: I think that that "depends" a great deal on the state of trade, on the state of politics, and on the degree to which the paper will, or will not, scruple to do mean things. A great many papers would pay better, if they were meaner. It would be a great deal easier to make a good paper, if you did not

have to sell it. When, then, Jonathan shall have become a minister, he doesn't want to bear down too hard on a "venal press" in his Fast Day and Thanksgiving sermons. Perhaps, by that time, Tom will be able to explain why.

"*How, now, is this paper made?*" "But," interrupts Jonathan, "before they make it, I should like to know where they get the 100,000 words to put into it; I have been cudgeling my brains for now two weeks to get words enough to fill a four page composition—say 200 words, *coarse.*"

The words which are put into it are, besides the advertisements, chiefly: 1. News; 2. Letters and articles on various subjects; 3. Editorial articles, reviews, and notes; 4. Odds and ends.

The "*letters and articles on various subjects*" come from all sorts of people: some from great writers who get large pay for even a brief communication; some from paid correspondents in various parts of the world; some from all sorts of people who wish to proclaim to the world some grievance of theirs, or to enlighten the world with some brilliant idea of theirs — which generally loses its luster the day the article is printed. A large proportion of letters and articles from this last class of people get sold for waste-paper before the printer sees them. This is

one considerable source of income to the paper, of which I neglected to tell Tom.

As for the "*odds and ends*" — extracts from other

A CONTRIBUTOR TO THE WASTE-PAPER BASKET.

papers, jokes, and various other scraps tucked in here and there — a man with shears and paste-pot has a

OFFICE OF THE EDITOR-IN-CHIEF.

good deal to do with the making of them. If you should see him at work, you would want to laugh at him — as if he were, for all the world, only little Nell cutting and pasting from old papers, a "frieze" for her doll's house. But when his "odds and ends," tastefully scattered here and there through the paper, come under the reader's eye, they make, I am bound to say, a great deal of very hearty laughter which is not that laughter of ridicule which the sight of him at his work might excite.

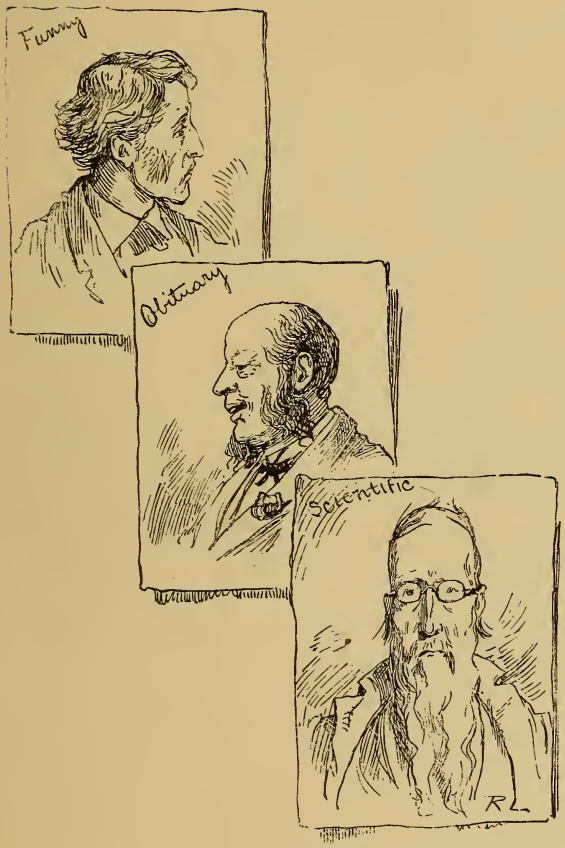
About the "*news*," I must speak more fully. The "*editorial articles*, *reviews*, *and notes*," we shall happen upon when we visit the office.

A part of the news comes by telegraph from all parts of the world. Some of it is telegraphed to the paper by its correspondents, and the editors call it "special," because it is especially to them. Perhaps there is something in it which none of the other papers have yet heard of. But the general telegraphic news, from the old-world and the new, is gathered up by the "Associated Press." That is to say, the leading papers form an Association and appoint men to send them news from the chief points in America and in Europe. These representatives of the Associated Press are very enterprising, and

they do not allow much news of importance to escape them. The salaries of these men, and the cost of the telegraphic dispatches, are divided up among the papers of the Association, so that the expense to each paper is comparatively small. Owing to this association of papers, hundreds of papers throughout the country publish a great deal of matter on the same day which is word-for-word alike.

Two devices in this matter of Associated Press dispatches save so much labor, that I think you will like me to describe them.

One is this: Suppose there are a dozen papers in the same city which are entitled to the Associated Press dispatches. Instead of making a dozen separate copies, which might vary through mistakes, one writing answers for all the dozen. First, a sheet of prepared tissue paper is laid down, then a sheet of a black, smutty sort of paper, then two sheets of tissue paper, then a sheet of black paper, and so on, until as many sheets of tissue paper have been piled up, as there are copies wanted. Upon the top sheet of paper, the message is written, not with pen, or pencil, but with a hard bone point, which presses so hard that the massive layers of tissue paper take off from the black paper a black line wherever the bone point has pressed. Thus a dozen pages are



REGULAR CONTRIBUTORS

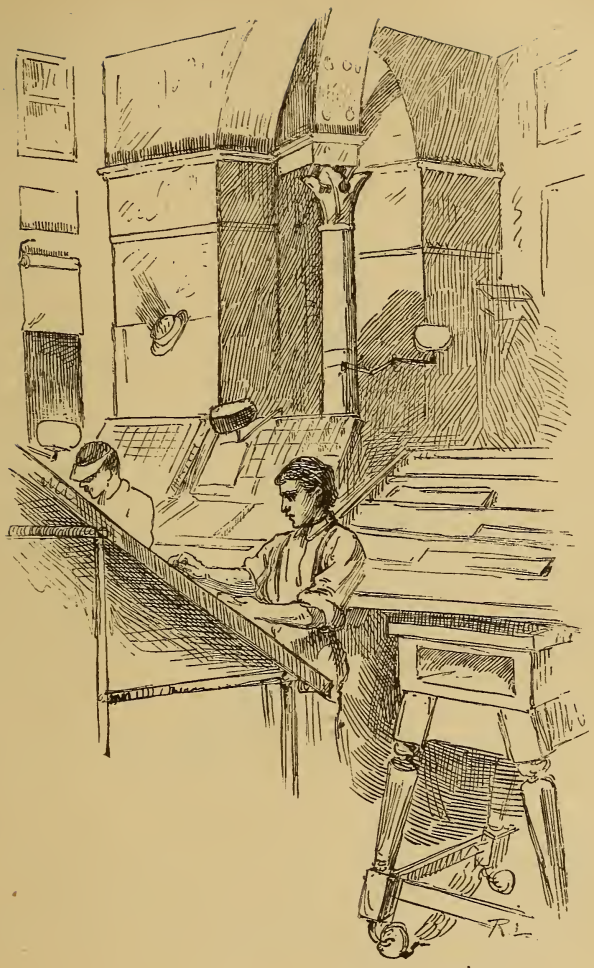
written with one writing, and off they go, just alike, to the several newspaper offices. The printers call this queer, tissue-paper copy — "manifold."

The other device is a telegraphic one. Suppose the Associated Press agent in New York is sending a dispatch to the Boston papers. There are papers belonging to the Association at, say, New Haven, Hartford, Springfield and Worcester. Instead of sending a message to each of these points, also, the message goes to Boston, and operators at New Haven, Hartford, Springfield, and Worcester, *listen to it as it goes through*, and copy it off. Thus one operator at New York is able to talk to perhaps a score of papers, in various parts of New England, or elsewhere, at once.

But in a large city there is a great deal of city and suburban news. Take for example, New York; and there is that great city, and Brooklyn, and Jersey City, and Hoboken, and Newark, and Elizabeth, to be looked after, as well as many large villages near at hand. And there is great competition between the papers, which shall get the most, the exactest, and the freshest, news. Consequently, each day, a leading New York paper will publish a page or more of local news. The City Editor has charge of collecting this news. He has, perhaps, twenty or twenty-

five men to help him — some in town, and others in the suburbs.

His plan for news collecting will be something like this: He will have his secretary keep two great journals, with a page in each devoted to each day. One of these, the "blotter," will be to write things in which are going to happen. Everything that is going to happen to-morrow, the next day, the next, and so on, the secretary will make a memorandum of or paste a paragraph in about upon the page for the day on which the event will happen. Whatever he, or the City Editor, hears or reads of, that is going to happen, they thus put down in advance, until by and by, the book gets fairly fat and stout with slips which have been pasted in. But, this morning, the City Editor wants to lay out to-day's work. So his secretary turns to the "blotter," at to-day's page, and copies from it into to-day's page in the second book all the things to happen to-day — a dozen, or twenty, or thirty — a ship to be launched, a race to come off, a law-case to be opened, a criminal to be executed, such and such important meetings to be held, and so on. By this plan, nothing escapes the eye of the City Editor who, at the side of each thing to happen, writes the name of the reporter whom he wishes to have write the event up. This second book



TYPE SETTERS' ROOM.

is called the "assignment book;" and, when it is made out, the reporters come in, find their orders

TYPE-SETTER'S CASE IN PI.

upon it, and go out for their day's work, returning again at evening for any new assignments. Besides this, they, and the City Editor, keep sharp ears

and eyes for anything new; and so, amongst them, the city and suburbs are ransacked for every item of news of any importance. The City Editor is a sort of general. He keeps a close eye on his men. He finds out what they can best do, and sets them at that. He gives the good workers better and better work; the poor ones he gradually works out of the office. Those who make bad mistakes, or fail to get the news, which some other paper gets, are frequently "suspended," or else discharged out-and-out. Failing to get news which other papers get, is called being "beaten," and no reporter can expect to get badly "beaten" many times without losing his position.

And now, Tom, and Jonathan, and even little Nell, we'll all be magicians to-night, like the father of Miranda, in "The Tempest," and transport ourselves in an instant right to one of those great newspaper offices.

It is six o'clock. The streets are dark. The gas-lights are glaring from hundreds of lamp-posts. Do you see the highest stories of all those buildings brilliant with lights? Those are the type-setters' rooms of as many great newspapers. In a twinkling we are several stories up toward the top of one of these buildings. These are the Editorial Rooms.

We'll make ourselves invisible, so that they'll not suspect our presence, and will do to-night just as they always do.

Up over our heads, in the room of the type-setters,

TAKING "PROOFS."

are a hundred columns, or more, of articles already set — enough to make two or three newspapers. The Foreman of the type-setters makes copies of these on narrow strips of paper with a hand-press, and

sends them down to the Editor-in-Chief. These copies on narrow strips of paper, are called "proofs," because, when they are read over, the person reading them can see if the type has been set correctly — can prove the correctness or incorrectness of the type-setting.

The Editor-in-Chief runs rapidly through these proofs, and marks, against here and there one, "*Must*," which means that it "must" be published in to-morrow's paper. Against other articles he marks, "*Desirable*," which means that the articles are "desirable" to be used, if there is room for them. Many of the articles he makes no mark against, because they can wait, perhaps a week, or a month. By having a great many articles in type all the time, they never lack — Jonathan will be glad to know — for something to put into the paper. Jonathan might well take the hint, and write his compositions well in advance. Against some of the articles, the word "*Reference*" is written, which indicates that when the article is published an editorial article or note with "reference" to it must also be published. Before the Editor-in-Chief is through, perhaps he marks against one or two articles the word "*Kill*," which means that the article is, after all, not wanted in the paper, and that the type of it may be taken

IN THE STEREOTYPERS' ROOM.

apart —the type-setters say "distributed" — without being printed.

When the Editor-in-Chief is through with the proofs, perhaps he has a consultation with the Managing Editor — the first editor in authority after him — about some plans for to-night's paper, or for to-morrow, or for next week. Perhaps, then, he summons in the Night Editor. The Night Editor is the man who stays until almost morning, who overlooks everything that goes into the paper, and who puts everything in according to the orders of the Editor-in-Chief, or of the Managing Editor. Well, he tells the Night Editor how he wants to-morrow's paper made, what articles to make the longest, and what ones to put in the most important places in the paper. Then, perhaps, the City Editor comes knocking at the door, and enters, and he and the Editor-in-Chief talk over some stirring piece of city news, and decide what to say in the editorial columns about it.

After the Editor-in-Chief has had these consultations, perhaps he begins to dictate to his secretary letters to various persons, the secretary taking them down in short-hand, as fast as he can talk, and afterwards copying them out and sending them off. That is the sort of letter-writing which would suit little Nell — just to say off the letter, and not to have to write

it — which, in her case, means "printing" it in great, toilsome capitals. After dictating perhaps a dozen letters, it may be that the Editor-in-Chief dictates in the same manner, an editorial article, or some other matter which he wishes to have appear in the paper. Thus he spends several hours — perhaps the whole night — in seeing people, giving directions, dictating letters and articles, laying out new plans, and exercising a general headship over all things.

Turning, now, from his room, we observe in the great room of the editors, a half dozen men or more seated at their several desks — the Managing Editor and the Night Editor about their duties; two or three men looking over telegraph messages and getting them ready for the type-setters; two or three men writing editorial, and other articles.

From this room we turn to the great room of the City Department. There is the City Editor, in his little, partitioned-off room, writing an editorial, we will suppose, on the annual report of the City Treasurer, which has to-day been given to the public. At desks, about the great room, a half-dozen reporters are writing up the news which they have been appointed to collect; and another, and another, comes in every little while.

FINISHING THE PLATE.

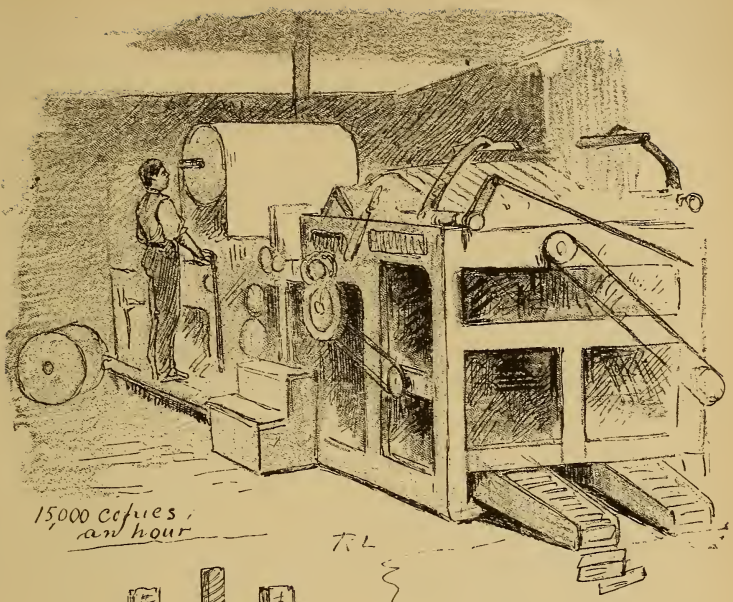
Over there, is the little, partitioned-off room for the Assistant City Editor. It is this man's duty, with his assistant, to prepare for the type-setters all the articles which come from the City Department. There are stacks and stacks of them. Each reporter thinks his subject is the most important, and writes it up fully; and, when it is all together, perhaps there is a third or a half more than there is room in the paper to print. So the Assistant City Editor, and his Assistant, who come to the office at about five o'clock in the afternoon, read it all over carefully, correct it, cut out that which it is not best to use, group all the news of the same sort so that it may come under one general head, put on suitable titles, decide what sort of type to put it in, etc., — a good night's work for both of them. They also write little introductions to the general subjects, and so harmonize and modify the work of twenty or twenty-five reporters, as to make it read almost as if it were written by one man, with one end in view.

The editors of the general news have to do much the same thing by the letters of correspondents, and by the telegraphic dispatches.

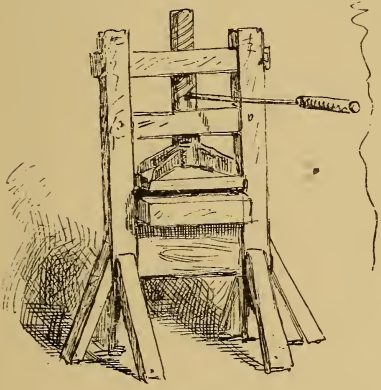
While this sort of work goes on, hour after hour, with many merry laughs and many good jokes interspersed to make the time fly the swifter, we will

wander about the establishment. Here, in the top story of the building, is the room of the type-setters. Every few minutes, from down-stairs in the Counting Room, comes a package of advertisements to be put into type; and from the Editorial Rooms a package of news and general articles for the same purpose. They do not trouble to send them up by a messenger. A tube, with wind blown through it very fast, brings up every little while a little leathern bag, in which are the advertisements or the articles — the "copy" as the type-setters call it.

In this room are thirty or forty type-setters. Each one of them has his number. When the copy comes up, a man takes it and cuts it up into little bits, as much as will make, say, a dozen lines in the paper, and numbers the bits — "one," "two," etc., to the end of the article. Type-setter after type-setter comes and takes one of these little bits, and in a few moments sets the type for it, and lays it down in a long trough, with the number of the bit of copy laid by the side of it. We will suppose that an article has been cut up into twenty bits. Twenty men will each in a few moments be setting one of these bits, and, in a few minutes more they will come and lay down the type and the number of the bit in the long trough, in just the right order of the number of the bits — "one," "two," etc. Then all the type will be



15,000 copies an hour

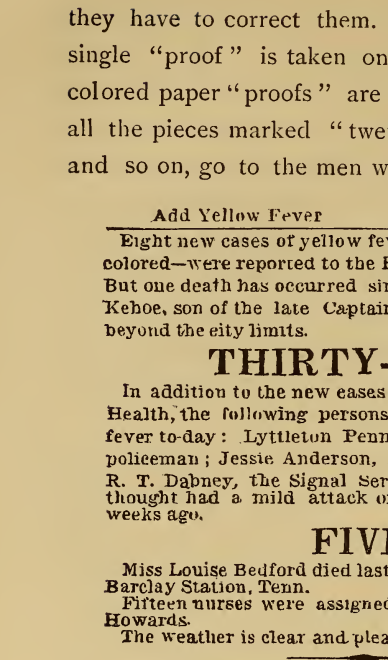


20 copies an hour

slid together, and a long article will thus be set in a few minutes, which it would take one or two men several hours to set. It is by this means that long articles can in so short a time be put into type. Each man who takes a bit, has to make his last line fill out to the end of the line; and, because there are sometimes not words enough, so that he has to fill out with some extra spaces between the words, you may often see in any large daily paper every two inches, or so, a widely spaced line or two showing how the type-setter had to fill out his bit with spaces — only he would call the bit, a "take."

I said that each type-setter has his number. We will suppose that this man, next to us, is number "twenty-five." Then he is provided with a great many pieces of metal, just the width of a column, with his number made on them — thus: "TWENTY-FIVE." Every time he sets a new bit of copy, he puts one of these "twenty-fives" at the top; and when all the bits of type in the long trough are slid together the type is broken up every two inches or so, with "twenty-five," "thirty-seven," "two," "eleven," and so on, at the top of the bits which the men, whose numbers these are, have set. When a proof of the article is taken, these several numbers appear; and, if there are mistakes, it appears from these numbers, what type-setters made them, and

they have to correct them. Also, of each article, a single "proof" is taken on colored paper. These colored paper "proofs" are cut up the next day, and all the pieces marked "twenty-five," "thirty-seven,' and so on, go to the men who have these numbers,



Add Yellow Fever

Eight new cases of yellow fever—four whites and four colored—were reported to the Board of Health to-day. But one death has occurred since last night, Archie P Kehoe, son of the late Captain P. M. Kehoe, who died beyond the city limits.

THIRTY-FOUR

In addition to the new cases reported to the Board of Health, the following persons were stricken with the fever to-day: Lyttleton Penn; P. S. Simonds, an ex-policeman; Jessie Anderson, Mrs. John Bierman, and R. T. Dabney, the Signal Service officer, who it was thought had a mild attack of the fever about three weeks ago.

FIVE

Miss Louise Bedford died last night of yellow fever at Barclay Station, Tenn.

Fifteen nurses were assigned to duty to-day by the Howards.

The weather is clear and pleasant.

TWENTY THREE

FAC-SIMILE OF "PROOF" SHOWING "TAKES."

and when pasted together show how much type, number "twenty-five," "thirty-seven," and so on, are to be paid for setting — for the type-setters are paid according to the amount of type which they set.

As fast as the proofs are taken they go into the room of the proof-readers to be corrected. The bits

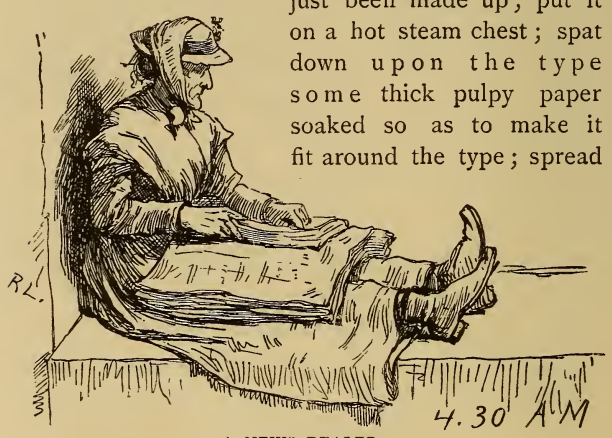
of copy are pasted together again, and one man holds the copy while another reads the proof aloud. The man holding the copy notices any points in which the proof does not read like the copy, and tells the man who is reading it. The man reading it corrects the variations from copy, and corrects all the other mistakes which he can discover, and then the type-setters have to change the type so as to make it right. There the proof readers sit hard at work, reading incredibly fast, and making rapid and accurate corrections; then the "copy" is locked up, and no one can get at it, except the Managing Editor or Editor-in-Chief gives an order to see it. This precaution is taken, in order to make certain who is responsible for any mistakes which appear in the paper—the editors, or the type-setters.

By this time it is nearly midnight, and the editors, type-setters, etc., take their lunches. They either go out to restaurants for them, or have them sent in—hot coffee, sandwiches, fruit, etc.—a good meal for which they are all glad to stop.

And now the Foreman of the type-setters sends to the Night Editor that matter enough is in type to begin the "make-up"—that is, to put together the first pages of the paper. There the beautiful type stands, in long troughs, all corrected now, the great

numbers of the type-setters removed from between the bits of type—the whole ready to be arranged into page after page of the paper. So the Night Editor makes a list of the articles which he wants on the page which is to be made up; the Foreman puts them in in the order which the Night Editor indicates; the completed page is wedged securely into an iron frame, and then is ready to be stereotyped.

The room of the stereotypers is off by itself. There is a furnace in it, and a great caldron of melted type metal. They take the page of the paper which has just been made up; put it on a hot steam chest; spat down upon the type some thick pulpy paper soaked so as to make it fit around the type; spread



A NEWS-DEALER.

plaster of Paris on the back, so as to keep the pulpy paper in shape; and put the whole under the press which more perfectly squeezes the pulpy paper down

upon the type, and causes it to take a more perfect impression of the type. The heat of the steam chest warms the type, and quickly dries the pulpy paper and the plaster of Paris. Then the pulpy paper is taken off, and curved with just such a curve as the cylinders of the printing-press have, and melted type metal is poured over it, which cools in a moment; when, lo, there is a curving plate of type-metal just like the type! The whole process of making this plate takes only a few minutes. They use such plates as these, rather than type, in printing the great papers chiefly for reasons like these: 1. Because plates save the wear of type; 2. Because they are easier handled; 3. Because they can be made curving, to fit the cylinders of the printing presses as it would be difficult to arrange the type; 4. Because several plates can be made from the same type, and hence several presses can be put at work at the same time printing the same paper; 5. Because, if anything needs to be added to the paper, after the presses have begun running, the type being left up-stairs can be changed and new plates made, so that the presses need stop only a minute for the new plates to be put on—which is a great saving of time.

But, coming down into the Editorial Rooms again —business Tom, and thoughtful Jonathan, and sleepy

little Nell—all is excitement. Telegrams have just come in telling of the wreck of an ocean steamer, and men are just being dispatched to the steamer's office to learn all the particulars possible, and to get, if it may be, a list of the passengers and crew. And now, just in the midst of this, a fire-alarm strikes, and in a few moments the streets are as light as day with the flames of a burning warehouse in the heart of the business part of the city. More men are sent off to that; and, what with the fire and the wreck, every reporter, every copy-editor, every type-setter and proof-reader are put to their hardest work until the last minute before the last page of the paper must be sent down to the press-rooms. Then, just at the last, perhaps the best writer in the office dashes off a "leader" on the wreck sending a few lines at a time to the type-setters — a leader which, though thought out, written, set, corrected, and stereotyped in forty minutes, by reason of its clearness, its wisdom, and its brilliancy, is copied far and wide, and leads the public generallyto decide where to fix the blame, and how to avoid a like accident again. There is the work of the "*editorial articles, reviews, and notes*" — to comment on events which happen, and to influence the minds of the public as the editorial management of the paper regards to

A BAD MORNING FOR THE NEWS-BOYS.

be wise. There is all sorts of this editorial writing —fun, politics, science, literature, religion —and he who says, with his pen, the say of such a newspaper, wields an influence which no mind can measure.

Well, the fire, and the wreck, have thoroughly awakened even little Nell. And so down, down we go, far under ground, to the Press-rooms. There the noise is deafening. Two or three presses are at work. At one end of the press is a great roll of paper as big as a hogshead and a mile or more long. This immense roll of paper is unwinding very fast, and going in at one end of the machine ; while at the other end, faster than you can count, are coming out finished papers—the papers printed on both sides, cut up, folded, and counted, without the touch of a hand—a perfect marvel and miracle of human ingenuity. The sight is a sight to remember for a lifetime. Upon what one here sees, hinges very much of the thinking of a metropolis and of a land.

And now, here come the mailing clerks, to get their papers to send off—with great accuracy and speed of directing and packing—by the first mails which leave the city within an hour and a half, at five and six o'clock in the morning. And after them come the newsboys, each for his bundle ; and soon the frosty morning air in the gray dawn is alive

with the shouting of the latest news in this and a dozen other papers.

This, I am sure, is too fast a world even for busi-

"ANY ANSWERS COME FOR ME?"

ness Tom: so let us "spirit" ourselves back to our beds in the quiet, slow-moving, earnest country—Tom and Jonathan and little Nell and I—home, and to sleep—and don't wake us till dinner-time!

A VISIT TO A CAMPHOR REFINERY.

PEMIGEWASSET HOUSE, PLYMOUTH, N. H.

DEAR PAUL: — You know I promised to write to you, if I saw anything interesting that I was sure you had never seen; and now I have, and so I will. For just after breakfast, a gentleman asked father if he wouldn't like to take an eight-mile drive with him to see some camphor works.

Father said, "Yes, indeed;" and then he stopped and looked at me; and he told me afterwards that my eyes were so big and pitiful that it was no wonder that the gentleman said, "Is this your little girl? I guess we can tuck her in if she don't want to be left."

So they did, and presently we were riding up one of the steepest hills I ever saw, and Plymouth was away down behind us, and then came West

Plymouth, and then we were going beside a very clear but very crooked stream called Baker's River, and the gentleman said, "This is Rumney, and that is Hawk Ledge, and there is Rattlesnake Mountain;" and, by and by, "Here is the camphor refinery."

He opened a gate, and we drove into a big grassy field, right up to the door of a rough, unpainted building, like a big barn, only there was a chimney smoking very hard at one end of it. Papa jumped me out, and into the wide-open door, and oh! such a suffocating smell of camphor, that I felt as if I must run out, or tumble down, or else sneeze my head off. But I thought in a minute that if you were there, you would say, "Come now, Laura, don't be a goose," and you'd behave exactly as if you'd smelt that smell, and nothing else, ever since you were born. So I stood still and looked all about, and thought what a good place it would be to put away furs in. Presently I got used to the air, and didn't mind it at all; and this is what I saw: A great, long room, as big as the biggest barn at grandpa's — a door wide open at each end — some little windows, very cobwebby and dusty (the man told us they hadn't

been washed for twenty years, and you'd think so), and what looked like three great dinner-tables, only they were made of brick, all set with double rows of covered dishes, just as if it was a boarding-school for giants, and every one was going to have an iron pan full of oatmeal for his breakfast. There were no seats for the giants, though, and when I went near the brick tables, I found they were really furnaces, with a hot fire in each; and when a man opened an iron door in the end of one, I saw that the fire was roaring red inside, made of great sticks of wood. Each furnace was so long that it held twenty pans, I am sure, and wide enough for two rows of them; so if the giants *had* come, there would have been a hundred and twenty in all, and even you, sir, would have been scared. Some of the pans were square and some were round, but every cover had a round hole in it about as big as an old copper cent, and over every hole was put a bright tin horn, just like a candle-extinguisher, only ten times as big. A tall man, with gray hair and very bright, pleasant eyes, was going about, lifting off these extinguishers, and poking something white

back into the hole in the cover with a knife.

I said to myself, "This is the giants' cook, and he is afraid their porridge will boil over before the lazy things come down to breakfast." But just then he noticed my staring, I suppose, and so he kindly showed me the inside of one of the horns; and it was thickly crusted with the loveliest white crystals, as delicate as frost, and as deep as mother's ermine. The white lump that he pushed back into the hole in the cover was just the same. Then I saw that all those pans held camphor-gum, and as the hot fire below melted and simmered it, these pure snowy crystals rose and clung to the inside of the cover, and rounded out at the hole, and up into the extinguisher, leaving all the sand and dirt and bits of wood in the bottom of the dish in a hard cake. Mr. Holden—that was the pleasant man's name—said that if he didn't keep on the extinguishers the crystals would be hanging all over the rough walls and rafters of the room. Wouldn't it look like a fairy palace or Aladdin's Cave?

Once, instead of pushing the camphor back, he ran his knife round it, took it out and laid it in my

hand. It felt hot through my glove, and looked like a spiral of fresh cream candy. He told me that the camphor was put into the iron pans just as it comes from China and Japan, and set on these furnaces to simmer for several days. The covers are cemented on with a paste made of whiting and rye-meal, so there is some porridge about it, after all.

At the end of each furnace is a pail of cold water, with a sponge in it, with which he cools off any dish that seems too hot; I had called them the giants' finger-glasses. Then father called me to the end of the room, and showed me a great tub full of the crude camphor, which looks just like dirty, coarse, white sugar, or the snow in Washington street when it is a week old. It comes from China and Japan in square boxes, covered with Eastern-looking matting, each box weighing about three hundred pounds. I know you like figures.

Last of all, I saw some of the pans which were all cooked and cooled, and another man was taking the camphor out to be sent away and sold. First he cracked off the cement that held on the cover, sweeping it into a heap on one side, to be wet and used

again, and then off came the cover with a great cake of pure, beautiful camphor an inch thick, sticking so fast to it that he had to force it off with a strong knife, and almost never got it off whole. It looked some like rock candy and some like ice, and the rubbish in the bottom of the pan looked like burnt bread. Mr. Holden thinks they get camphor out of the camphor trees, very much as he gets maple sugar —first tapping the tree for sap, and then boiling it down. His refinery is the only one in New England, except one in Connecticut, but that is owned in New York. We stopped at another interesting place going home; but I am so sleepy I must save that for another letter.

UMBRELLAS.

ABOUT one hundred and thirty years ago, an Englishman named Jonas Hanway, who had

THE FIRST UMBRELLA.

been a great traveller, went out for a walk in the city of London, carrying an umbrella over his head.

Every time he went out for a walk, if it rained or if the sun shone hotly, he carried this umbrella, and all along the streets, wherever he appeared, men and boys hooted and laughed; while women and girls, in door-

WHAT JONAS SAW ADOWN THE FUTURE.

ways and windows, giggled and stared at the strange sight, for this Jonas Hanway was the first man to commonly carry an umbrella in the city of London,

and everybody, but himself, thought it was a most ridiculous thing to do.

But he seems to have been a man of strength and courage, and determined not to give up his umbrella even if all London made fun of him. Perhaps, in imagination, he saw adown the future, millions of umbrellas — umbrellas enough to shelter the whole island of England from rain.

Whether he did foresee the innumerable posterity of his umbrella or not, the "millions" of umbrellas have actually come to pass.

But Jonas Hanway was by no means the first man in the world to carry an umbrella. As I have already mentioned, he had travelled a great deal, and had seen umbrellas in China, Japan, in India and Africa, where they had been in use for so many hundreds of years that nobody knows when the first one was made. So long ago as Nineveh existed in its splendor, umbrellas were used, as they are yet to be found sculptured on the ruins of that magnificent capital of Assyria, as well as on the monuments of Egypt which are very, very old; and your ancient history will tell you that the city of Nineveh was founded not long after the flood. Perhaps it was that great rain, of forty days and forty nights, that put in the minds of Noah, or some of his sons, the idea to build an umbrella!

Although here in America the umbrella means nothing but an umbrella, it is quite different in some of the far Eastern countries. In some parts of Asia and Africa no one but a royal personage is allowed to carry an umbrella. In Siam it is a mark of rank. The King's umbrella is composed of one umbrella above another, a series of circles, while that of a nobleman consists of but one circle. In Burmah it is much the same as in Siam while the Burmese King has an umbrella-title that is very comical: "Lord of the twenty-four umbrellas."

The reason why the people of London ridiculed Jonas Hanway was because at that time it was considered only proper that an umbrella should be carried by a woman, and for a man to make use of one was very much as if he had worn a petticoat.

There is in one of the Harleian MSS. a curious picture showing an Anglo-Saxon gentleman walking out, with his servant behind him carrying an umbrella; the drawing was probably made not far from five hundred years ago, when the umbrella was first introduced into England. Whether this gentleman and his servant created as much merriment as Mr. Hanway did, I do not know; neither can I tell you why men from that time on did not continue to use the umbrella. If I were to make a "guess" about it, I should say that they thought it would not be "proper," for it was

LORD OF THE TWENTY-FOUR UMBRELLAS

considered an unmanly thing to carry one until a hundred years ago when the people of this country first began to use them. And it was not until twenty years later, say in the year 1800, that the "Yankees" began to make their own umbrellas. But since that time there have been umbrellas and umbrellas!

The word umbrella comes from the Latin word *umbra*, which means a "little shade;" but the name, most probably, was introduced into the English language from the Italian word *ombrella*. Parasol means "to ward off the sun," and another very pretty name, not much used by Americans, for a small parasol, is "parasolette."

It would be impossible for me to tell you how many umbrellas are made every year in this country. A gentleman connected with a large umbrella manufactory in the city of Philadelphia gave me, as his estimate, 7,000,000.

This would allow an umbrella to about one person in six, according to the census computation which places the population of the United States at 40,000,000 of people. And one umbrella for every six perrons is cetainly not a very generous distribution. Added to the number made in this country, are about one-half million which are imported, chiefly from France and England.

You who have read "Robinson Crusoe," remember how he made his umbrella and covered it with skins, and that is probably the most curious umbrella you can anywhere read about. Then there have been umbrellas covered with large feathers that would shed rain like a "duck's back," and umbrellas with coverings of oil-cloth, of straw, of paper, of woollen stuffs, until now, nearly all umbrellas are covered either with silk, gingham, or alpaca. And this brings us to the manufacture of umbrellas in Philadelphia, where there are more made than in any other city in America.

If you will take an umbrella in your hand and examine it, you will see that there are many more different things used in making it than you at first supposed.

First, there are the "stick," made of wood, "ribs," "stretchers" and "springs" of steel; the "runner" "runner notch," the 'ferule," "cap," "bands" and "tips" of brass or nickel; then there are the covering, the runner "guard" which is of silk or leather, the "inside cap," the oftentimes fancy handle, which may be of ivory, bone, horn, walrus tusk, or even mother-of-pearl, or some kind of metal, and, if you will look sharply, you will find a rivet put in deftly here and there.

For the "sticks" a great variety of wood is used; although all the wood must be hard, firm, tough, and capable of receiving both polish and staining. The cheaper sticks are sawed out of plank, chiefly, of

A "DUCK'S BACK" UMBRELLA.

maple and iron wood. They are then "turned" (that is made round), polished and stained. The "natural sticks," not very long ago, were all imported from England. But that has been changed, and we now send England a part of our own supply, which consists principally of hawthorne and huckleberry, which come from New York and New Jersey, and of oak, ash, hickory, and wild cherry.

If you were to see these sticks, often crooked and gnarled, with a piece of the root left on, you would

think they would make very shabby sticks for umbrellas. But they are sent to a factory where they are steamed and straitened, and then to a carver, who cuts the gnarled root-end into the image of a dog or horse's head, or any one of the thousand and one designs that you may see, many of which are exceedingly ugly. The artist has kindly made a picture for you of a "natural" stick just as it is brought from the ground where it grows, and, then again, the same stick after it has been prepared for the umbrella.

Of the imported "natural" sticks, the principal are olive, ebony, furze, snakewood, pimento, cinnamon, partridge, and bamboo. Perhaps you do not understand that a "natural" stick is one that has been a young tree, having grown to be just large enough for an umbrella stick, when it was pulled up, root and all, or with at least a part of the root. If, when you buy an umbrella that has the stick bent into a deep curve at the bottom for the handle, you may feel quite sure that it is of partridge wood, which does not grow large enough to furnish a knob for a handle, but, when steamed, admits of being bent.

The "runner," "ferule," "cap," "band," etc., form what is called umbrella furniture and for these articles there is a special manufactory. Another manu-

factory cuts and grooves wire of steel into the "ribs" and "stretchers." Formerly ribs were made out of cane or whalebone; but these materials are now seldom used. When the steel is grooved, it is called a "paragon" frame, which is the lightest and best made. It was invented by an Englishman named Fox, seventeen or eighteen years ago. The latest improvement in the manufacture of "ribs" is to give them an inward curve at the bottom, so that they will fit snugly around the stick, and which dispenses with the "tip cup," — a cup-shaped piece of metal that closed over the tips.

AN UMBRELLA HANDLE
au naturel.

Of course we should all like to feel that we Americans have wit enough to make everything used in making an umbrella. And so we have in a way; but it must be confessed that most of the silk used for umbrella covers, is brought from France. Perhaps

if the Cheney Brothers who live at South Manchester in Connecticut, and manufacture such elegant silk for ladies' dresses, and such lovely scarfs and cravats for children, were to try and make umbrella silk, we would soon be able to say to the looms of France, "No more umbrella silk for America, thank you; we are able to supply our own!"

CUTTING THE COVERS.

But the "Yankees" do make all their umbrella gingham, which is very nice. And one gingham factory that I have heard about has learned how to dye gingham such a *fast* black, that no amount of rain or

sun changes the color. The gingham is woven into various widths to suit umbrella frames of different size, and along each edge of the fabric a border is formed of large cords. As to alpaca, a dye-house is being built, not *more* than a "thousand miles" from Philadelphia on the plan of English dye-houses, so that our home-made alpacas may be dyed as good and durable a black as the gingham receives; for although nobody minds carrying an *old* umbrella, nobody likes to carry a faded one. Although there are umbrellas of blue, green and buff, the favorite hue seems to be black.

And now that we have all the materials together to make an umbrella, let us go into a manufactory and see exactly how all the pieces are put together.

First, here is the stick, which must be "mounted." By that you must understand that there are two springs to be put in, the ferule put on the top end, and if the handle is of other material than the stick, that must be put on.

The ugliest of all the work is the cutting of the slots in which the springs are put. These are first cut by a machine; but if the man who operates it is not careful, he will get some of his fingers cut off. But after the slot-cutting machine does its work, there is yet something to be done by another man with a

knife before the spring can be put in. After the springs are set, the ferule is put on, and when natural sticks are used, as all are of different sizes, it requires

FINISHING THE HANDLE.

considerable time and care to find a ferule to fit the stick, as well as in whittling off the end of the stick to suit the ferule. And before going any farther

you will notice that all the counters in the various work-rooms are carpeted. The carpet prevents the polished sticks from being scratched, and the dust from sticking to the umbrella goods.

After the handle is put on the stick and a band put on for finish or ornament, the stick goes to the frame-maker, who fastens the stretchers to the ribs, strings the top end of the ribs on a wire which is fitted into the "runner notch;" then he strings the lower ends of the "stretchers" on a wire and fastens it in the "runner," and then when both "runners" are securely fixed the umbrella is ready for the cover.

As this is a very important part of the umbrella, several men and women are employed in making it. In the room where the covers are cut, you will at first notice a great number of V shaped things hanging against the wall on either side of the long room. These letter Vs are usually made of wood, tipped all around with brass or some other fine metal, and are of a great variety of sizes. They are the umbrella cover patterns, as you soon make out. To begin with, the cutter lays his silk or gingham very smoothly out on a long counter, folding it back and forth until the fabric lies eight or sixteen times in thickness, the layers being several yards in length. (But I must go back a little and tell you that both edges of the

silk, or whatever the cover is to be, has been hemmed by a woman, on a sewing machine before it is spread out on the counter). Well, when the cutter finds that he has the silk smoothly arranged, with the edges even, he lays on his pattern, and with a sharp knife quickly draws it along two sides of it, and in a twinkling you see the pieces for perhaps two umbrellas cut out; this is so when the silk, or material, is sixteen layers thick and the umbrella cover is to have but eight pieces.

After the cover is cut, each piece is carefully examined by a woman to see that there are no holes nor defects in it, for one bad piece would spoil a whole umbrella.

Then a man takes the pieces and stretches the cut edges. This stretching must be so skilfully done that the whole length of the edge be evenly stetched. This stretching is necessary in order to secure a good fit on the frame.

After this the pieces go to the sewing-room, where they are sewed together by a woman, on a sewing-machine, in what is called a "pudding-bag" seam. The sewing-machine woman must have the machine-tension just right or the thread of the seam will break when the cover is stretched over the frame.

The next step in the work is to fasten the cover to

SEWING "PUDDING-BAG" SEAMS.

the frame, which is done by a woman. After the cover is fastened at the top and bottom, she half hoists the umbrella, and has a small tool which she uses to keep the umbrella in that position, then she fastens the seams to the ribs; and a quick workwoman will do all this in five minutes, as well as sew on the tie, which has been made by another pair of hands. Then the cap is put on and the umbrella is completed.

But before it is sent to the salesroom, a woman smooths the edge of the umbrella all around with a warm flat-iron. Then another woman holds it up to a window where there is a strong light, and hunts for holes in it. If it is found to be perfect the cover is neatly arranged about the stick, the tie wrapped about it and fastened, and the finished umbrella goes to market for a buyer.

After the stick is mounted, how long, think you does it take to make an umbrella?

Well, my dears — it takes only fifteen minutes!

So you see that in the making of so simple an every-day article as an umbrella, that you carry on a rainy day to school, a great many people are employed; and to keep the world supplied with umbrellas thousands and thousands of men and women are

kept busy, and in this way they earn money to buy bread and shoes and fire and frocks for the dear little folks at home, who in turn may some day become umbrella makers themselves.

HOW FISH-HOOKS ARE MADE.

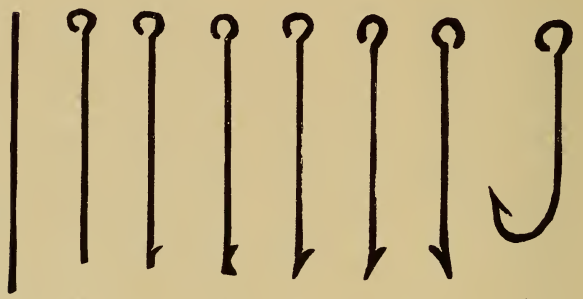
BOYS, how long do you suppose it would take you to make a respectable fish-hook? What do you suppose it would cost you to have a first-class workman make you one as good as one you can buy for a penny?

But I saw a magical little machine, not long ago, bite off a little piece of steel wire, chew it a moment, and then spit it out formed into a perfect hook. It would toss out these little hooks every half second, the different machines making the different sizes.

There are eight steps in the making of a fish-hook by the machines I saw. The boy who tended one of them snatched specimens from the machine as they were passing through, and showed me how each stroke of the little chisels and hammers added to the

bit of wire that went in, until it came out a finished hook and ready to fish with, though probably the more fastidious fish wouldn't touch it because it hadn't yet been polished.

The curious little machines would first nip off bits of wire; another stroke of the machine, and the bit of wire had a little loop in one end (fig. 2). The next



half second the wire had a hack in it near the other end (fig. 1). Then came a little hammer-stroke which flattened out the hacked end like fig. 4. Then a little chisel shaved this flattened end into a point (fig. 5). Then finishing tools shaped down the sides of the point (figs. 6 and 7, though we cannot show it plainly). And last of all, it receives one crook, and

drops, a perfectly formed hook, into the little bucket, having been, only four seconds before, nothing but an inch or more of steel wire on a reel.

There are two ways of finishing these hooks. Either they are "japanned," which gives them the black finish which is the most common one, or they are finished with that fine blue that is frequently put upon swords and cutlery. It is done by heating them in a furnace till they come to a "cherry-red" as the workmen call it, and then they are poured into a bucket of oil and left to cool.

After finishing, they are taken up to the deft-fingered girls, who rapidly count them by hooking them over a piece of coarse wire, and throwing out at the same time the imperfect ones. Then they pack them in neat boxes, and they are stacked up ready for market.

But I suppose this is only the tamest part of the history of these murderous little objects. How many of them do you suppose will ever hook a fish? Maybe one in a hundred. Perhaps not one in five hundred. How many of them will slumber, the sport of the fishes, imbedded in some old log at the bottom of

some pool or river where they have stuck and stuck, though tugged at and twitched at by the luckless little boy who hasn't caught anything yet, and who hasn't another to fasten on in their place! How many weary miles they must go, some of them, with hungry, wet, tired little fellows (and perhaps big fellows too), innocent of any fish, and in having had no bites save from mosquitos. But here and there one shall thrust point and barb into some fish who with more appetite than discretion has failed to see the trap set for him, and out and up into the air has rushed, "his silver armor flashing useless in the sun," to make a supper for the lucky fisherman.

PAUL AND THE COMB-MAKERS.

LITTLE Paul Perkins — Master Paul his uncle called him — did not feel happy. But for the fact that he was a guest at his uncle's home he might have made an unpleasant exhibition of his unhappiness; but he was a well-bred city boy, of which fact he was somewhat proud, and so his impatience was vented in snapping off the teeth of his pocket-combs, as he sat by the window and looked out into the rain.

It was the rain which caused his discontent. Only the day before his father, going from New York to Boston on business, had left Paul at his uncle's, some distance from the "Hub," to await his return. It being the lad's first visit, Mr. Sanford had arranged a very full programme for the next day, including a trip in the woods, fishing, a picnic, and in fact quite

enough to cover an ordinary week of leisure. Over and over it had been discussed, the hours for each feature apportioned, and through the night Paul had

MASTER PAUL DID NOT FEEL HAPPY.

lived the programme over in his half-waking dreams.

And now that the eventful morning had come, it brought a drizzling, disagreeable storm, so that Mr.

Sanford, as he met his nephew, was constrained to admit that he did not know what they should find to supply the place of the spoiled programme.

"And my little nephew is so disappointed that he has ruined his pretty comb, into the bargain," said the uncle.

"I was — was trying to see what it was made of," Paul stammered, thrusting the handful of teeth into his coat pocket. "I don't see how combs are made. Could you make one, uncle?"

"I never made one," Mr. Sanford replied, "but I have seen very many made. There is a comb-shop not more than a half-mile away, and it is quite a curiosity to see how they make the great horns, rough and ugly as they are, into all sorts of dainty combs and knicknacks."

"What kind of horns, uncle?"

"Horns from all parts of the country, Paul. This shop alone uses nearly a million horns a year, and they come in car-loads from Canada, from the great West, from Texas, from South America, and from the cattle-yards about Boston and other Eastern cities."

"You don't mean the horns of common cattle?"

"Yes, Paul; all kinds of horns are used, though some are much tougher and better than others. The

cattle raised in the Eastern, Middle and Western States furnish the best horns, and there is the curious difference that the horns of six cows are worth no more than those of a single ox. Many millions of horn combs are made every year in Massachusetts; perhaps more than in all the rest of the country. If you like we will go down after breakfast and have a look at the comb-makers."

Paul was pleased with the idea, though he would much rather have passed the day as at first proposed. He was not at all sorry that he had broken up his comb, and even went so far as to cut up the back with his knife, wondering all the while how the smooth, flat, semi-transparent comb had been produced from a rough, round, opaque horn.

By and by a mail stage came rattling along, without any passengers, and Mr. Sanford took his nephew aboard. They stopped before a low, straggling pile of buildings, located upon both sides of a sluggish looking race-way which supplied the water power, covered passage-ways connecting different portions of the works.

"Presently, just over this knoll," said his uncle, "you will see a big pile of horns, as they are unloaded from the cars."

MY LADY'S TOILET.

They moved around the knoll, and there lay a monstrous pile of horns thrown indiscriminately together.

"Really there are not so many as we should think," said Mr. Sanford, as Paul expressed his astonishment. "That is only a small portion of the stock of this shop. I will show you a good many more."

He led the way to a group of semi-detached buildings in rear of the principal works, and there Paul saw great bins of horns, the different sizes and varieties carefully assorted, the total number so vast that the immense pile in the open yard began to look small in contrast.

At one of the bins a boy was loading a wheelbarrow, and when he pushed his load along a plank track through one of the passage-ways Mr. Sanford and his nephew followed. As the passage opened into another building, the barrow was reversed and its load deposited in a receptacle a few feet lower.

In this room only a single man was employed, and the peculiar character of his work at once attracted the attention of Paul. In a small frame before him was suspended a very savage-looking circular saw, running at a high rate of speed. The operator caught

one of the great horns by its tip, gave it a turn through the air before his eyes, seized it in both hands and

THE NEW CIRCLE COMB.

applied it to the saw. With a sharp hiss the keen teeth severed the solid tip from the body of the horn,

and another movement trimmed away the thin, imperfect parts about the base. The latter fell into a pile of refuse at the foot of the frame, the tip was cast into a box with others; the horn, if large, was divided into two or more sections, a longitudinal slit sawn in one side, and the sections thrown into a box.

"This man," said Mr. Sanford, "receives large pay and many privileges, on account of the danger and unpleasant nature of his task. He has worked at this saw for about forty years, and in that time has handled, according to his record, some twenty-five millions of horns, or over two thousand for every working day. He has scarcely a whole finger or thumb upon either hand — many of them are entirely gone; but most of these were lost during his apprenticeship. The least carelessness was rewarded by the loss of a finger, for the saw cannot be protected with guards, as in lumber-cutting."

Paul watched the skilful man with the closest interest, shuddering to see how near his hands passed and repassed to the merciless saw-teeth as he sent a ceaseless shower of parts of horns rattling into their respective boxes. Before he left the spot Paul took a pencil and made an estimate.

"Why, uncle," he said, "to cut so many as that, he must saw over three horns every minute for ten hours a day. I wouldn't think he could handle them so fast."

Then, as he saw how rapidly one horn after another was finished, he drew forth his little watch and found that the rugged old sawyer finished a horn every ten seconds with perfect ease.

"Would you like to learn this trade?" the old fellow asked. He held up his hands with the stumps of fingers and thumbs outspread; but Paul only laughed and followed his uncle.

They watched a boy wheeling a barrow-load of the horns as they came from the saw, and beheld them placed in enormous revolving cylinders, through which a stream of water was running, where they remained until pretty thoroughly washed. Being removed from these, they were plunged into boilers ranged along one side of the building, filled with hot water.

"Here they are heated," said Mr. Sanford, "to clear them from any adhering matter that the cold water does not remove, and partially softened, ready for the next operation."

From the hot water the horns were changed to a

ANCIENT OR MODERN — WHICH?

series of similar caldrons at the other side of the room, filled with boiling oil. Paul noticed that when the workmen lifted the horns from these vats their appearance was greatly changed, being much less opaque, and considerably plastic, opening readily at the longitudinal cut made by the saw. As the horns were taken from the oil they were flattened by unrolling, and placed between strong iron clamps which were firmly screwed together, and put upon long tables in regular order.

"Now I begin to see how it is done," Paul said, though he was thinking all the time of questions that he would ask his uncle when there were no workmen by to overhear.

"The oil softens the horn," said Mr. Sanford, "and by placing it in this firm pressure and allowing it to remain till it becomes fixed, the whole structure is so much changed that it never rolls again. Some combs, you will notice, are of a whitish, opaque color, like the natural horn, while others have a smooth appearance, are of amber color, and almost transparent. The former are pressed between cold irons and placed in cold water, while the others are hot-pressed, it being 'cooked' in a few minutes. These plates of horn may be colored; and there are a great many

'tortoise-shell' combs and other goods sold which are only horn with a bit of color sprinkled upon it.

"The solid tips of the horns, and all the pieces that are worth anything cut off in making the combs, are made up into horn jewelry, chains, cigar-holders, knife-handles, buttons, and toys of various kinds. These trinkets are generally colored more or less, and many a fashionable belle, I suppose, would be surprised to know the amount of money paid for odd bits of horn under higher sounding names. But the horn is tough and serviceable, at any rate, and that is more than can be said of many of the cheats we meet with in life."

The next room, in contrast with all they had passed through previously, was neat and had no repulsive odors. Here the sheets of horn as they came from the presses were first cut by delicate circular saws into blanks of the exact size for the kind of combs to be made, after which they were run through a planer, which gave them the proper thickness.

"What do you mean by 'blanks'?" Paul asked, as his uncle used the term.

"You can look in the dictionary to find its exact meaning," was the answer. "But you will see what it is in practice at this machine."

"IN SOME REMOTE CORNER OF SPAIN."

They stepped to another part of the room; and here Paul saw the "blanks" placed in the cutting-machine standing over a hot furnace, where, after being softened by the heat, they were slowly moved along, while a pair of thin chisels danced up and down, cutting through the centre of the blank at each stroke. When it had passed completely through, an assistant took the perforated blank and pulled it carefully apart, showing two combs, with the teeth interlaced. After separation they were again placed together to harden under pressure, when the final operations consisted of bevelling the teeth on wheels covered with sandpaper, rounding the backs, rounding and pointing the teeth; after which came the polishing, papering and putting in boxes.

"I suppose they go all over the country," said Paul as he glanced into the shipping-room.

"Much further than that," was the reply. "We never know how far they go; for the wholesale dealers, to whom the combs are shipped from the manufactory, send them into all the odd corners of the earth. Every little dealer must sell combs, and in the very nature of the business they frequently pass through a great many hands before reaching the user, so at the last price is many times what the

makers received for them. I suppose it often happens that horns which have been sent thousands of miles to work up are returned to the very regions from which they came, in some other form, increased very many fold in value by their long journey. Or a horn may come from the remoter parts of South America to be wrought here in Massachusetts, and then be shipped from point to point till it reaches some remote corner of Africa, Spain, or Siberia, as an article of barter. And even different parts of the same horn may be at the same moment decking the person of a New York dandy and unsnarling the tangled locks of a Russian Tchuktch."

While Paul was watching the deft fingers of the girls who filled the boxes and affixed the labels, his uncle stepped through a door communicating with the office, and soon returned with three elegant pocket-combs.

"One of these," he said, "represents a horn which came from *pampas* of Buenos Ayres; this one, in the original, dashed over the boundless plains of Texas; and here is another, toughened by the hot, short summers and long, bitter winters of Canada. Take them with you in memory of this cheerless rainy day."

Paul could not help a little sigh as he thought again of the pleasures he had enjoyed in anticipation; but still he answered bravely, "Thank you; never mind the rain, dear uncle. All the New York boys go off in the woods when they get away from home; but not many of them ever heard how combs are made, and I don't suppose a quarter of them even know what they are made of. I can tell them a thing or two when I get home."

IN THE GAS-WORKS.

PHILIP and Kitty were curled up together on the lounge in the library, reading Aldrich's "Story of a Bad Boy." It was fast growing dark in the corner where they were, for the sun had gone down some time before, but they were all absorbed in Tom Bailey's theatricals, and did not notice how heavy the shadows were getting around them. Papa came in by-and-by.

"Why, little folks, you'll spoil your eyes reading here; I'd better light the gas for you," and he took out a match from the box on the mantle.

"O, let me, please," cried Philip, jumping up and running to the burner. So he took the match, and climbed up in a chair with it. Scr-a-tch! and the new-lit jet gave a glorified glare that illuminated everything in the room, from the Japanese vase on the

corner bracket to the pattern of the rug before the open fire. But as Philip turned it off a little it grew quieter, and finally settled down into a steady, respectable flame. Philip always begged to light the gas. It had not been long introduced in the little town where he lived, and the children thought it a very fine thing to have it brought into the house, and secretly pitied the boys and girls whose fathers had only kerosene lamps.

"Why can't you blow out gas, just as you do a kerosene light?" asked Kitty, presently, leaving the Bad Boy on the lounge, and watching the bright little crescent under the glass shade.

"Because," explained papa, "unless you shut it off by turning the little screw in the pipe, the gas will keep pouring out into the room all the time, and if it isn't disposed of by being burned up, it will mix with the air and make it poisonous to breathe. A man at the hotel here, a few nights ago, blew out the gas because he did not know any better, and was almost suffocated before he realized the trouble and opened his window."

"And where does the gas come from in the first place?" pursued Kitty

"Why, from the gas-works, of course," said Philip in a very superior way, for he was a year the elder of

the two. "That brick building over by Miller's Hill — don't you know — that we pass in going to Aunt Hester's."

"I know that as well as you do, Philip Lawrence," said Kitty with some dignity. "What I wanted to know was what it's made out of. What is it, papa?"

"Out of coal," said papa. "They put the coal in ovens and heat it till the gas it contains is separated from the other parts of the coal, and driven off by itself. Then it is purified and made ready for use.

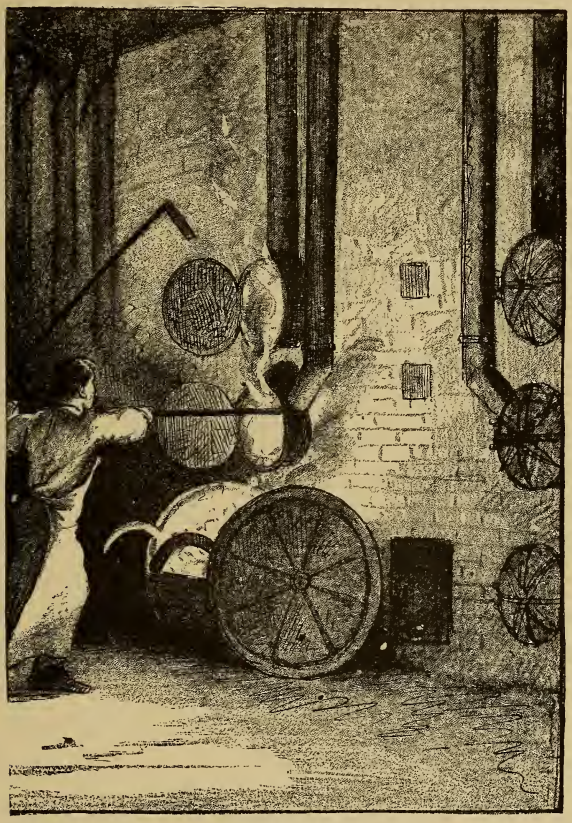
"Out of coal? How funny! I wish I could see all about it," said Philip, looking more interested.

"And so do I wish I could," added Kitty.

"I don't see why it cannot be done," said papa. "If you really care to see it, and won't mind a few bad smells, I will ask Mr. Carter to-morrow morning, when he can take you around and explain things."

The next day when Mr. Carter was asked about it, he said, "O, come in any day you like. About three in the afternoon would be a good time, because we are always newly-filling the retorts then." This sounded very nice and imposing to the children, and at three the next afternoon they started out with papa. The gas-house certainly did smell very badly asthey drew near it, and dainty Kitty sniffed in considerable disgust. Philip suggested that perhaps she

had better not go in after all; he didn't believe girls



A Retort.

ever did go into such places. And upon that Kitty

valiantly declared she did not mind it a bit, and sternly set her face straight.

Mr. Carter met them at the door. "You are just in time to see the retorts opened," said he, and led the way directly into a large and very dingy room, along one side of which was built out a sort of huge iron cupboard with several little iron doors. The upper ones were closed tight, but some of the lower ones were open a crack, and a very bright fire could be seen inside. Everything around was dirty and gloomy, and these gleams of fire from the little iron doors made the place look weird and ghostly. Long iron pipes reached from each of the upper doors up to one very large horizontal pipe or cylinder near the ceiling overhead. This cylinder ran the whole length of the room, and, at its farther end, joined another iron pipe which passed through the wall.

"Those are the furnace-doors down below," said Mr. Carter to the children. "What you see burning inside of them is coke. Coke is what is left of the coal after we have taken the gas and tar out of it. The upper doors open into the retorts, or ovens, that we fill every five hours with the coal from which we want to get gas. Each retort holds about two hundred pounds, and from that amount we get a thousand cubic feet of gas."

"Is it just common coal;" asked Kitty, "like what people burn in stoves?"

"Not exactly. It is a softer kind, containing more of a substance called hydrogen than the sorts that are generally used for fuel. Several different varieties are used: 'cherry,' 'cannel,' 'splint,' and so on, and they come from mines in different parts of England and Scotland, chiefly. Glasgow, Coventry and Newcastle send us a great deal."

Philip started as if a bright idea had struck him. "Is that what people mean when you're doing something there's no need of, and they say 'you're carrying coals to Newcastle?'"

"Yes. You see such an enterprise would be absurd. Just notice the man yonder with the long iron rod! He is going to open one of the retorts, take out the old coal — only it is now coke — and put in a fresh supply."

A workman in a grimy, leather apron loosened one of the retort doors, and held up a little torch. Immediately a great sheet of flame burst out, and then disappeared.

He took the door quite off, and there was a long, narrow oven with an arched top, containing a huge bed of red-hot coals.

"What a splendid place to pop corn!" exclaimed Kitty.

Papa laughed. "You would find it warm work," said he, "unless you'd a very long handle to your corn-popper." And Kitty thought so too, as she went nearer the fiery furnace.

"You see," said Mr. Carter, "these red-hot coals have been changed a great deal by the heat. They have given up all their gas and tar, and are themselves no longer coal, but *coke*. We shovel out this coke and use it as fuel in the furnaces down below to help heat up the next lot. Then new coal is put into the retorts, and they are closed up with iron plates, like that one lying ready on the ground."

"It's all muddy 'round the edge," observed Kitty.

"Yes, that paste of clay is to make it air-tight. The heat hardens the clay very quickly, so all the little cracks around the edge are plastered up. When the coal is shut up in the ovens, or retorts, the heat, as I just told you, divides it up into the different substances of which it is made; that is, into the coke which you have seen, a black, sticky liquid called tar, the illuminating gas, and more or less ammonia, sulphur, and other things that must be got rid of. Almost all these things are saved and used for one purpose or another, though they may be of no use to

us here. If we have more coke than we ourselves need it is sold for fuel. The coal-tar goes for roofing and making sidewalks, or sometimes (though you wouldn't think it possible, as you look at the sticky, bad-smelling, black stuff) in the manufacture of the most lovely dyes, like that which colored Miss Kitty's pink ribbon. The ammonia is used for medicine and all sorts of scientific preparations, in bleaching cloth, and in the printing of calicoes and cambrics."

"When the materials of the coal are separated as I told you in the retorts, most of the tar remains behind, and is drawn off; but some gets up the pipes. That large, horizontal cylinder is always nearly half full of it. The gas, which is very light, you know, rises through the upper pipes leading from the retorts, and bubbles up through the tar in the bottom of the cylinder. Then it passes along the farther end of the cylinder, and into the condensing pipes."

He opened a door, and they went through into the next room. Here the large pipe which came through the wall of the room they had just left, led to a number of clusters of smaller pipes that were jointed and doubled back and forth upon each other, cob-house fashion.

"When the gas goes through these pipes," said Mr. Carter, "it gets pretty well cooled down, for the

pipes are kept cold by having so great an amount of surface exposed to draughts of air around them. And when the gas is cooled the impurities are cooled too, so that many of them take a liquid form and can be drawn off."

The next room they entered had a row of great, square chests on each side, as they walked through.

"These are the purifiers," explained Mr. Carter again. "They are boxes with a great many fan-like shelves inside, projecting out in all directions, and covered thickly with a paste made of lime."

"Lime like what the masons used when they plastered the new kitchen?" asked Philip.

"About the same thing. The boxes are made air-tight, and the gas enters the first box at one of the lower corners. Then before it can get through the connecting-pipe into the next box, it has to wind its way around among these plates coated with lime. This lime takes up the sulphur and other things that we do not want in the gas, and so by the time it gets through all the boxes it is quite pure and fit to use."

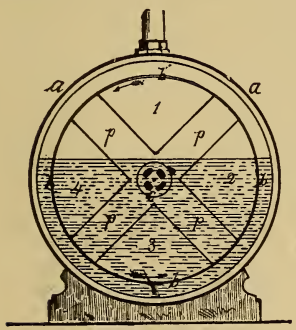
Then the party all went into the room where the gas was measured. It was a little office with a queer piece of furniture in it; something that looked like a very large drum-shaped clock, with several different dials or faces. This, Mr. Carter said, was the metre

KITTY IN THE GAS-WORKS.

or measurer, and by looking at the dials it could be told exactly how much gas was being made every day.

"As soon as the gas gets through the purifiers," said he, "it comes, by an iron pipe, in here, and is made to pass through and give an account of itself before any of it is used. And now I suppose you would like to know how it does report its own amount, wouldn't you?"

Philip and Kitty both were sure they did want to know, so he sketched a little plan of the metre on a piece of paper, and then went on to explain it:



THE METRE.

"This shows how the metre would look if you could cut it through in the middle. The large drum-shaped box A. A. is hollow, and filled a little more than half way up with water. Inside it is a smaller hollow drum, B. B. so arranged as to turn easily from right to left, on the horizontal axis C. This axis is a hollow pipe by which the gas comes from the purifiers to enter the several chambers of the metre in turn, through small openings called

valves. The partitions P. P. P. P. divide the drum B. B. into — let us say — four chambers, 1, 2. 3, 4, all of the same size, and capable of holding a certain known amount of air or gas. The chamber 1 is now filled with gas, 3 with water, and 2 and 4 partly with gas and partly with water. The valves in the pipe C are so arranged that the gas will next pour into the chamber 2. This it does with such force as to completely fill it, lifting it quite out of the water and into the place that 1 had occupied before. Then as 1 is driven over to the place which 4 had occupied, the gas with which it was filled passes out by another pipe and off to the large reservoir you will see by and by, its place being filled with water. At the same time 4 is driven around to the place of 3, and 3 to that of 2. The water always keeps the same level, and simply waits for the chambers to come round and down to be filled.

"Next, 3, being in the place of 2, receives its charge of gas from the entrance pipe, is in turn lifted up into the central position, and sends all the other chambers around one step further. And when the drum gets completely around once, so that the chambers stand in the same places as at first, you know each chamber must have been once filled with gas and then emptied of it. If then we know that each

chamber will hold, say two and a half cubic feet of gas, we are sure that every time the drum has turned fully around it has received and sent off four times two and a half feet, or ten feet in all. Now we connect the axis C with a train of wheel-work, something like that in a clock, and this wheel-work moves the pointers on the dials in front, so that as the gas in passing in and out of the chambers turns the drum on the axis, it turns the dial pointers also.

"The right hand dial marks up to one hundred. While its pointer is passing completely around once, the pointer on the next dial (which marks up to one thousand) is moving a short space and preserving the record of that one hundred; and then the first pointer begins over again. The two pointers act together just like the minute and hour hands on a clock. Then the next dial marks up to ten thousand, and acts in turn like an hour-hand to the thousands' dial as a minute-hand, and so on. You see each dial has its denominations, 'thousands,' hundred thousands,' or whatever it may be, printed plainly below it. And now, when we want to read off the dials, we begin at the left, taking in each case the last number a pointer *has passed*, and read towards the right, just as you have learned to do with any numbers in your 'Eaton's Arithmetic.' There is one thing

more to remember, however ; the number you read means not simply so many cubic feet of gas but so many hundred cubic feet."

Philip and Kitty immediately set to work to read the dials on the office metre, and found that they were not now so very mysterious.

"But how do you know how much people use?" asked Philip. "There is something like this metre, only smaller, down cellar at home, and a man came and looked at it the other day, to see how much gas had been burned in the house he said, when I asked him what he was going to do."

"The metre you have at home works in the same way as this," said Mr. Carter, "and the dial-plates are read in the same way. But the gas that your little metre registers is only that which you take from the main supply-pipe, to light your parlors and bed-rooms.

When a stream of gas from the main enters the house, it has to pass through the metre the very first thing, before any of it is used ; and each little metre keeps as strict an account of what passes through from the main to the burners, as the large one here in the office does of that which passes from the purifiers to the reservoir. But there is this difference between the two : the gas keeps pouring through the office metre as long as we keep making it in the re-

torts, but it passes through your metre at home only just as long as you keep drawing it off at the burners. So if we find by looking at the metre that 5450 feet have passed through during a given time, we send in our bill to your papa for that amount, knowing it must have been burned in the house.

"But most likely the metre doesn't say anything directly about 5450. It says, perhaps, 11025. 'How can that be?' you would think. 'We haven't burned so much as that,' and you haven't — during this one quarter. But after the metre had been inspected at the end of the last quarter, the pointers did not go back to the beginning of the dials and start anew; they kept right on from the place where they were, so that 11025 is the amount you paid for last time and the amount you want to pay for this time, lumped together. Now this is what we do. We turn to our books and see how much you were charged with last time, and substracting that record from the present record leaves the amount you have used since the last time of payment.

"Then suppose another case. Your metre registers only as far as 100,000. At the end of the last quarter it marked 97850; now it records but 3175. How would you explain that, master Philip?"

Philip looked puzzled a moment, and then said,

"I should think it must have finished out the hundred thousand and begun over again."

"Exactly. And to find the amount for this quarter you would add together the remainder of the hundred thousand (2150) and the 3175, and get 5325, the real record. But I guess you've had arithmetic enough for the present, so we'll go out now and see the gasometer, or gas reservoir."

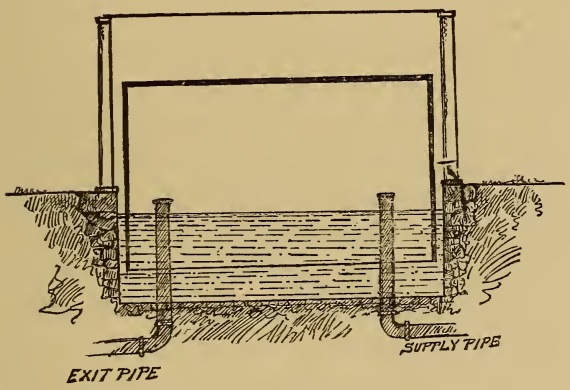
They all went out of doors then, papa, Mr. Carter, Philip and Kitty, across a narrow court-yard. There was a huge, round box, or drum, with sides as high as those of the carriage-house at home, but with no opening anywhere, "like a great giant's band-box," thought Kitty. Four stout posts, much taller still than the "bandbox" itself, were set at equal distances around it, and their extremities were joined by stout beams which passed across over the top of the gasometer.

As the children went up nearer to it, they saw it was made of great plates of iron firmly riveted together, and that it did not rest on the ground, as they had supposed, but in the middle of a circular tank of water.

"After the gas has been made and purified and measured," said Mr. Carter, "it is brought by underground pipes into this gasometer, and from here

drawn off by other pipes into the houses. The weight of this iron shell bearing down upon the gas, gives pressure or force enough to drive the gas anywhere we wish."

"But why do you put the — the iron thing in



The Gasometre.

water, instead of on the ground?" asked Kitty.

"So as to make it air-tight, and give it a chance to move freely up and down. Of course if the iron shell were empty its own weight would make it sink directly to the bottom of the water-tank and stay there. But gas, you know, is so much lighter than

common air that it always makes a very strong effort to rise higher and higher, carrying along whatever encloses it. You saw that illustrated in the balloon that went up last Fourth of July. Now, as the gas from the works pours into the reservoir from beneath, it is strong enough to lift the iron box up a little in the water. Of course that gives a little more room. Then as more gas comes in to take up this room, the gasometer keeps on rising slowly. We make sure of its not rising above the water and letting the gas leak out, by means of the beams you see stretched across above it. They are all ready to hold it down in a safe position if the need should come.

"On the other hand, as the people in town draw off the gas to burn, the gasometer would, of course, tend to sink down gradually. So we have the water-tanks made deep enough to allow for every possible necessity in that direction. In very cold weather we keep the water from freezing by passing a current of hot steam into it. If it should ever freeze, the gasometer might as well be on the ground, for it could not move up and down, or be trusted to keep the gas from leaking out around the edges. With these precautions, however, we know it is perfectly trustworthy."

"I saw it one morning early, when I was out coasting on the hill," said Philip, "and it wasn't more than half as high as it is now."

"A great deal had been drawn off during the night and we had not been making any more during the time to take its place.

"Does it ever get burned out too much?"

"No, there's no danger of it. We make enough to allow a good large margin above what we expect will be used."

The children looked about a little longer, and then, with good-byes and many thanks to Mr. Carter, walked home again with papa, over the crisp, hard snow.

Next week Philip had a composition to write at school. He took "Gas" for his subject, and wrote:

"Gas that you burn is made out of soft coal. They put it in Ovens and cook it until it is not coal any longer. The Ovens are so hot you cant go anywhare near them but the men do With poles and big lether aprons. I would not like to shovle in the coal. I would rather have a Balloon. They use two or three tons every day. it makes coke and Tar and the gas that goes up the pipes. They make the gas clean and mesure it in a big box of water, and tell how much there is by looking at the clock faces in front. Then it goes into a big round box made of iron and then we burn it. but I do not like to smell of it. you must not blow it out for if you do you will get choked. This is all I Remember about gas.

"PHILIP RAYMOND LAWRENCE."

THE WAY HE MADE THE FISHING-ROD

IT is hardly to be expected that girls will be interested in fishing-rods, but boys are — *boys*. And if there is one instinct that is earlier developed in them than another, it is to go a-fishing. To be sure, the desperate desire to burn gunpowder in some way, to touch off a tiny cannon if possible, and at all events to fire India-crackers, comes very early; but to fish with a bent pin at the end of a string, if nothing better offers, is the realization of the small urchin's idea of a good time. To get dismissed "before school is done," or play truant and stay out altogether if he dares, or take his half-holiday and trudge off to some place where water is — without his mother's knowledge, through a conviction that her consent could not be obtained if she knew — and fish

THE LITTLE MAN'S EXPERIENCE OF HAPPINESS.

all the afternoon with bits of dismembered grasshoppers for bait, and go home at sundown, wet and tired and muddy, and hot and hungry, with only one shoe on, and carrying two dried-up shiners strung on a forked twig — *that* is the little man's experience of happiness.

There is something in the vagabondage of fishing, and more in the uncertainty about the result — the good luck or the no luck — which captivates the boy's fancy all along till he is boy no longer; and when he puts away his childish things he by no means includes this. Annually on the return of April, when the first "good day for trout to bite" comes round, "his sisters and his cousins and his aunts" are sure to be besieged by the questions: "Where are all my trout-lines? What has become of my hooks? I should like to know — will anybody tell me — who has been meddling with my rod!" And there is a sound of running up and down-stairs, and general rummaging till the things are found and the angler is out of the house. Nor does the matter end with trout; for are there not pickerel and salmon and bass, and finny creatures of many names in many places?

But it is not of the fishers themselves, nor of their lines or their hooks, nor of what they catch, that this paper is to be written. About fishing and about fish, from a whale down to a sardine, how much has been said! While as for the rods, except to the manufacturers and users — who was ever especially interested in *them?* Yet, for all that, a good deal might be told. Even so simple a thing as a rod of split bamboo has quite a history before it is ready equipped for service.

A bamboo, be it said, can be put to more uses than any other thing of the vegetable kind in the world. What would our opposite neighbors in the Celestial Empire do without it? It is employed for nearly every conceivable, besides some almost inconceivable purposes, on land and water, and even in the air; for kites are made of it, and so are the queer little whistles bound to the tame pigeons to frighten crows from the grain-fields. It can be used in the whole cane, in strips, in segments, or in threads, and no part comes amiss. The tubes are suitable for water-pipes, and so it answers for aqueducts: it is so strong that foot-bridges are constructed of it, and

light enough for rafts; so available that a whole house can be built of it — the frame, the thatch, the lattices, the partitions — and it furnishes material for the tables and chairs, and some of the utensils and decorative articles; it is so hard that knives are made from thin slices, and so delicate that it may be carved into daintiest of boxes, and even thimbles and necklaces; so elastic that baskets are woven of it, so fibrous that it may be twisted into ropes and cordage. It supplies lining for the chests of tea, strands for fishing-nets, strips for fans, and canes stiff enough for oars and spears and palanquin-poles. It is one of the four things without which China would be China no longer: rice for food, tea for drink, silk for wear, and bamboo for everything.

There are said to be more than sixty varieties of this wonderful thing, which is neither grass nor tree, yet is in structure like grass, while it grows in dense groves, like trees, and shoots away up even to the height of a hundred and fifty feet, and is nothing after all but a hollow, jointed reed.

The kind from which the fishing-poles are made comes from Calcutta; and though we oftenest see

it variegated by rich waves of brown, the natural color is buff, and those beautiful markings are acquired by fire, through which the natives pass the canes for the purpose of straightening them, and also to burn off the hairy sheath about the joints, and to kill any insects that may be harbored there. At least this is what one intelligent, observing manufacturer told us; while another said that the Orientals try different kinds of stain on them, and so diversify the surface which takes so easily a fine color and polish. Either account is well enough, and perhaps books of travel and encyclopædias will give both. As they lie in piles in the shops they look dingy enough, although any one can see that the final polishing and varnishing will bring out the patches of rich brown and black we are so accustomed to, not only in the finished rods but in walking-sticks and umbrella-handles. They are imported in bunches of fifty, of irregular lengths, as the natives happened to cut them, from twelve to twenty-five feet, but averaging about eighteen; and the first thing is to cull them over and select the good ones, which are then

scraped and reduced to the proper lengths, and they are then ready to be split.

Just here you may ask why it is necessary that a bamboo cane, which already looks as nearly ready for a fish-pole as if nature had made it on purpose for one, should be split into strands and then glued together. But this is done to secure strength with out adding to the weight; and a very nice piece of work it is before the whole thing is completed.

In Boston there is a factory where only this class of rods is made; and in Cambridge there is a modest shop where one of the brightest of English artisans, who has also tried his hand at making bows for archery practice, works in this same line.

Between the two places there is a good deal to be learned, and what one man did not tell us the other did. The process of splitting, however, which is the most interesting part, is a secret not to be revealed to outsiders. It was formerly done by hand; but our British workman said he invented the first machine ever used in the United States — and probably in any country — for splitting bamboo for fishing-rods. He was four years in perfecting it, and in the mean

time his wife knit and crocheted articles from Shetland wool to help support the family. "Without her I don't know where I would have been," he said. She came into the passage-way with one child in her arms and another clinging to her apron, and eyed us curiously while we listened to her good-man's story.

A stack of the untouched canes stood in one corner, together with a few of the Chinese, which he showed us, that we might see the difference. "These be always buff," he remarked, "smoother, of another quality, not so elastic — another thing altogether." And then he illustrated his way of going to work, only we did not have a sight of the machine at all. "We split 'em," he said, "to make the rod stronger. The more strands, the more strength. Now look at this trout-pole. Just heft it. It is so light you can't hardly keep it down. But look at here. Look at the spring of it. Just bend it. Don't be afraid — it won't break. There! you can almost bring it together till end touches end. That is not heavier than a whip-handle. That is eleven feet and a half long, and it weighs eight ounces. But it will hold a mighty big trout. You see the weight is graduated so

there is an even spring from butt to tip. Your trout is a strong fellow, likewise a sly one. You are never sure of him till you've landed him, and have him off the hook and in the basket, and the cover shut and the peg put in. And *then* you're not sure. He'll dodge you if he can."

But about the splitting-machine?

"Yes. A bamboo will split like a whalebone from end to end, and the strength is all in the bark;" and he split off that skin of silex which is so hard that fire will strike from it when the hatchet hits it as the natives are cutting down the canes. That marvellous flinty film into which all the holding power is packed, is only four one-thousandths of an inch in thickness (I put it down on the spot where I heard it, to be accurate, for it was too much or too little to trust one's memory with), and the texture of the wood is a bunch of coarse fibres that can be pulled apart like a hempen string.

And did he always have six strands in the make-up of a rod? One man had stated that a hexagon was the most perfect shape, "the most complete circle," bringing the strain equally on all parts.

He said, "No: sometimes four, sometimes six, sometimes eight, as we please. But anyhow, it is always perfect. The taper is just exact clear along. We take the cane and give it to the machine, and she gives us back just the number of strands we ask for. And they are precisely alike to a hair. They can't vary. And when they come together they are an exact fit. There *can't* be a failure. She never makes a mistake. If there's a fault, it's mine and not hers."

The next thing is to take the bunch of strands, place one end in a vise, grasp the other in the hand, and dipping a brush into a pot of hot glue ready on the bench, pass it swiftly between them, and then wind close with strong twine, which is left on till the glue is thoroughly dried; and the drying is purposely a slow process, that no strand may spring back from over-heating. At a proper time the cord is removed, and the rod is gently scraped clean from anything that may have adhered to it. The glue used is absolutely water-proof, and holds so tenaciously that if by any accident the rod should split, the fissure never follows the joining, but the wood down the bark. It is as compact as if it were the closest and hardest of grain.

The rods are manufactured in sections, for convenience in carrying, some being known as "trunk rods;" but "the fewer the joints, the more pliable it is," he said, "and the less metal it has to contend with." Each section is finished with brass or German-silver ferrules into which the cane fits with mathematical certainty; and as these ferrules are sometimes "drawn," as they say, instead of being brazed, it is impossible that they should split. Every precaution is thus taken for strength, elasticity, nicety of adjustment and durability. Then the butt has a wooden dowel fitted in and glued, forming what is technically called the "reel-seat," where the reel or "pirn" for the line is to be secured; and the place where the wood is bare and where it joins the cane is wound with a fine strand of bamboo-grass, which gives the swell to the handle.

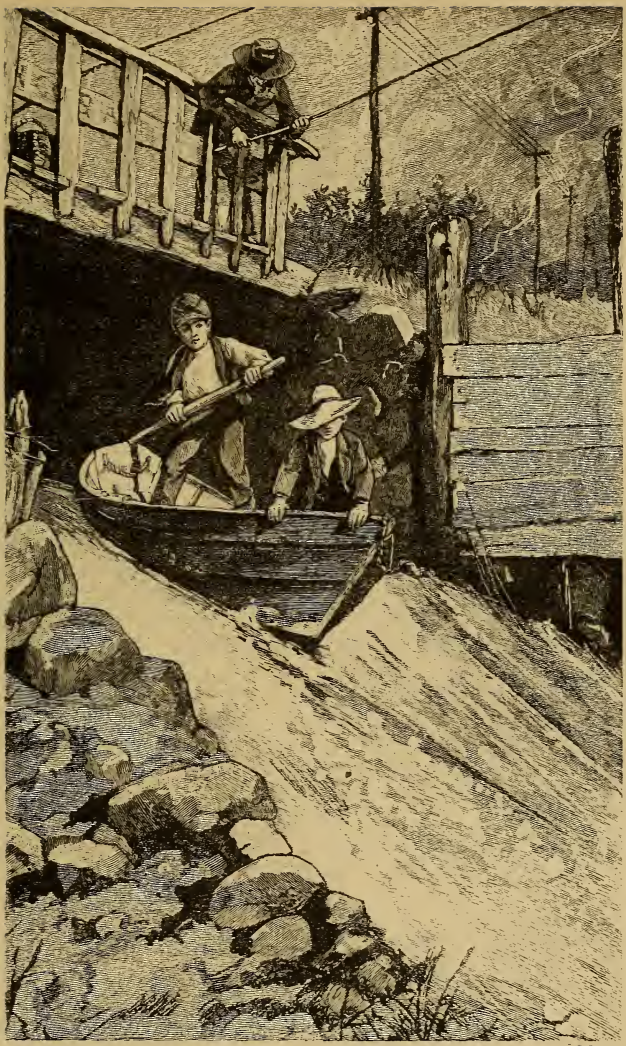
Next the little rings in which the line is to run are attached at intervals, graduated from a distance of ten inches down to three, and each has a metal "keeper" to hold it, and to help retain the ring in place; and also, for ornament, a thread of the finest silk that is made is wound in bands about the rod;

the colors are usually scarlet or purple, and this part of the work is done by a woman.

"She fixes the spool on a spindle, lays the end of the silk on the rod, and gives it a twirl, *so*," said our English friend; "the next time round she covers the end, and when she breaks it off, she ties a knot, *so*, gives it another twirl and cuts the fibres off. But the last end of the silk would be sure to fray out as soon as it is wet, so we shellac it over, and that holds it down."

So much painstaking down to the smallest matter! And now it is ready for the varnish, which is of a peculiar glassy kind, and is put on in a warm room where a frame stands ready to receive the sections which fit into "rests," where they remain a long time to dry. It takes about three months to get a rod of split bamboo through the several processes ready for the market.

The wholesale trade is in the fall; the retail begins about the first of April and lasts till the first of September, and the work is done "between times." The light fly-rods for trout sell for from twenty to forty dollars apiece; then there are the bass-rods, and those for



SPRING FISHING.

salmon, made in three joints, weighing thirty-two ounces, with reels that hold four hundred yards of line, such as the Canadian anglers like; they are packed in wooden cases having compartments into which each piece fits, all lined with shaggy cloth, and furnished with an outer covering of the same material. With the fly-rod goes a "tip-case," containing two extra tips, as that slender section is liable to get broken.

Much more, and in a better way than it is put down here, did the genial Englishman tell, as he balanced one of the delicate poles on his finger, and of his own experiences when he and Professor Agassiz used to go fishing together; for, said he, "Agassiz and me were intimate," as one could well believe, since there was such freshness about the man, and he had such a fund of practical information. Then he spoke about the fly, and showed us one attached to the silvery thread which, he said, "they call silkworm gut."

The fly was made of a few colored bits of feather "to attract the trout: this is from a canary; that from a wild duck's breast; and on the water the

motion makes 'em sure to expand and part and close like wings of a fly, deceiving the fish. Take care! You did not see the hook inside. No more does the trout."

And the silk?

"It comes from Italy, in a little hank like this;" and he held up a bunch of five shining things like silver hair, tied with crimson silk. "I never see no longer ones, nor larger. It is costly stuff. It comes at about four or five dollars a hundred. A single one of the best is worth ten cents. You can't see how we can tie two together? There's a way. And there's a way to tie hair. We lap one end away by the other, and tie two knots and wet it, in this way; and the more it is soaked in water the tighter it will be, and nothing will ever make it come untied. No, it is never any longer. That is what comes from one worm. That's what they tell me. They hold the worm in a sort of mould, and draw out this thread. They finish it as we see it. I don't know *how* it's done, nor what time in the worm's life, or whether the worm is dead.

But it seemed to me that I could guess too near the

"YOUR TROUT IS A STRONG FELLOW, LIKEWISE A SLY ONE."

truth; for I had seen too many silkworms not to fear that the poor creature was subject to this treatment while it was yet alive. At the time when, being ready to spin its own beautiful cocoon, it had ceased to eat and become almost transparent, *then* it must have been that a cruel thing was done, — that the silvery web was drawn in the one lustrous line, and the little life extinguished with it.

The places where the common rods are made are not of very much interest except as one likes to know about the different kinds of wood employed. The rods of whole bamboo or of ash have tips of horn beam, lancewood and greenheart, as being more compact and elastic and capable of bearing a heavier strain.

The first comes from our own forests, but the others are foreign; the greenheart is from British Guiana, where it grows, a tapering stem without a branch till it seems to pierce the sky, and is as hard as *lignum vitæ*, and takes the most exquisite polish; the other is from Jamaica, wonderfully suited for the uses which its name suggests. The bark is like that of the white ash, and the ends of some of the slender logs which

lay in piles on the floor were cracked just as a Red Astrachan apple cleaves apart at the stem when it is dead-ripe; while others were yellow with the shellac which had been put on to prevent this damage. The making of fishing-rods seemed really entitled to an important place among the industries, when we found that so many regions must be traversed for materials, even the jungles of Hindostan, the wilds on the Amazon and the strange forests of the West Indian islands.

RACING A THUNDER-STORM.

IF it had been a yacht in which we were speeding along at the rate of a trifle over a mile per minute, we should have "taken our reckoning," "hove the log," or done something nautical, and the captain would doubtless have reported in regular sea-faring terms that we were off Oil City with Lake Chautauqua so and so many knots on our port quarter.

But it wasn't a yacht, nor a schooner, nor a Lonestoga wagon, lightning express or catamaran, in which we were travelling neck and neck with one of the wildest looking storm clouds of hot mid-summer.

No. It was — can you guess it? Yes, a *balloon.*

And this is how it all came about:

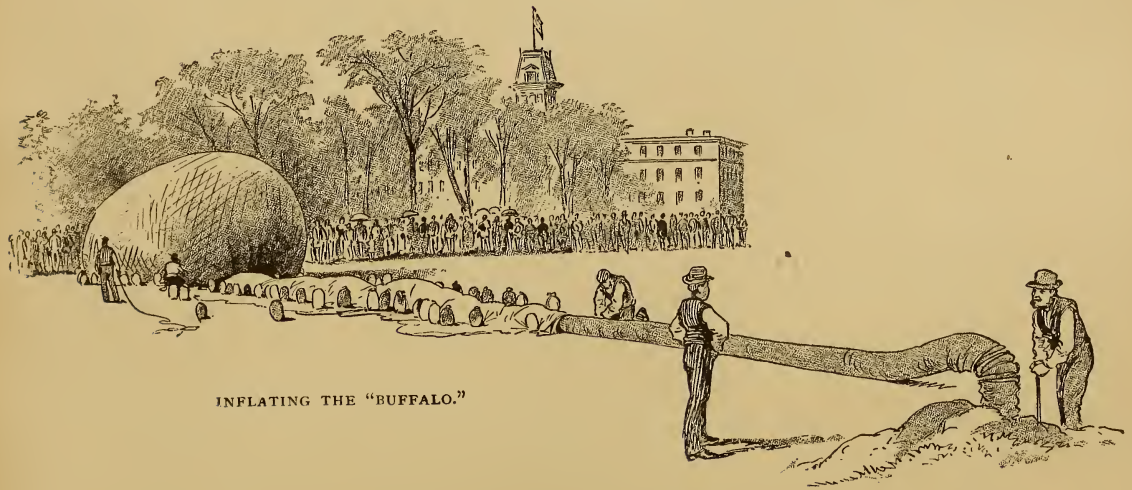
Fourth of July came upon the *fifth* that year, (because of some strange oversight on the part of the folks who first hit upon the plan of dividing time into

weeks, somehow the Fourth will, every once in a while, strike Sunday.)

At least it did in Cleveland; and although they were a day late, the Clevelanders determined to have a big time. So they had sent for Prof. Samuel A. King, an aeronaut of distinction. Balloonists, you know, are nearly always called "Professors"— why this is so I don't *profess* to know. And Prof. King had arrived in Cleveland a few days before, bringing his great balloon, the "Buffalo."

Early upon the morning of the 5th he was on hand with the helpless monster all in a heap tied about with ropes, mixed up with netting and sand-bags, and supplemented with a big basket which looked a good deal like an inverted straw hat made for some huge giant.

The netting was carefully spread out on the Nicholson pavement in the centre of the pretty square that you will remember if you have ever been in Cleveland. The bags were filled from a wagon-load of sand and hitched with snap-catches about the edges. So they stood about in a circle. Then the aerostat, as the great bag is called, was unrolled and spread evenly over this. An oiled-muslin tube was tied to the neck, and its other extreme to a gas



INFLATING THE "BUFFALO."

main in a hole which some of the workmen had dug for the purpose.

Next the gas was turned on. The bag began to rise, looking at first like ever so many young whales all huddled together. The men now began, under the Professor's direction, to pull the netting over to hold the bag down. The sand-bags were brought closer and set along on either side of the tube. The bag now began to grow round and plump. Groups of lookers-on kept growing, too, until all the square was alive with them. The helpers kept walking around the swelling globe, changing the bags to lower strands of the netting; and so it continued until by two o'clock the balloon was full — that is, allowance was made only for expansion when the balloon should have reached the clouds.

Every few moments the breeze would sway the monster to and fro, and it seemed chafing to break away. Soon after, the basket was tied upon the ring, and into this a great heap of sand-bags was piled, and a lot of ropes, an anchor, an aneroid, thermometer, compass and other accessories tied into the rigging or outside of the basket.

How grandly she stood there, the vast dome towering above the trees, her amber sides bright with dec-

orations and her shapely globe held in leash by the white network — but bless me! here's more than four pages used up, and we haven't started yet.

At precisely four o'clock the Professor's cheery voice was heard all through the square as he sang out, "All aboard!" And his eight companions responded as soon as they could get through the dense crowd that surged on every side.

Now the sole remaining rope which held us to the earth was gripped by a score of eager men.

The order came, "Let go!" The basket was raised a few feet and then settled slowly back. This made the crowd laugh.

"Throw out two bags!" cried the Professor.

Then — then how grandly we lifted! How the cannon roared and bands added their noise to the shouts of the hundred thousand people whose faces were all turned toward our little wicker car!

The writer was sand-man, and following orders, he let out the contents of another bag which fell in a swift gray stream plump down into the midst of a little group of young ladies who were seated on a house-top.

If it happens that *this book* reaches that family, opportunity is now taken to apologize to those young

ladies for thus pouring sand down the backs of their necks.

Well, we sailed along grandly, soon leaving the city far behind — I forgot to say that just as we were leaving, a darkey in a white apron came through the crowd bringing us a hamper of good things. What an appetite this keen upper air gave us, to be sure! We ate and drank and toasted everything and everybody.

Pretty soon one of the boys said, (we were all newspaper men, and spoke of each other as "boys"):

"Listen a moment!"

And we all held our breaths. What supreme silence! the gentle sighing of the wind among the trees a mile below, the barking of dogs, or subdued shouts of excited villagers, was all we could hear — but hark!

We were approaching a small town. In the square, through the gathering twilight, we could discern a crowd, and now there came to us, refined by distance, the familiar notes, played by the village band, of "Up in a balloon, boys!"

We passed over the village, and the Professor pulled the valve cord gently, so we dropped towards the place and cheered in reply.

"Now let's give them a song," said the Professor.

So he began, and we came in on the chorus :

"Oh! 'twas old Sam Simons,
And young Sam Simons,
Old Sam Simons' son :
Now young Sam Simons
Is old Sam Simons,
For old Sam Simons is gone."

I wish the editor would only give me room to tell you about the scores of funny things that happened that afternoon ; but after all, the real adventures happened the next day. So I can only speak briefly of the pretty carrier-pigeons we loosed, which flew swiftly back to Cleveland, bearing our messages to the newspapers — short notes only, to be sure, wrapped about their slender legs, and which appeared in the papers the following morning. One of these I find in the scrap-book before me, for it was returned to me some weeks afterwards. It reads :

"*We've just eaten supper out of our hamper, unhampered by any fears as to breakfast. Supper above the clouds is what I call high living. We can see you yet, but you are only a smoky stain upon the shore of Lake Erie. The Professor says we are to go into camp and then continue trip to-morrow. Good-night.*"

It would never do, either, to forget the plucky dog

A PLUCKY DOG.

which ran after our drag-rope as it trailed along the ground when we were quite near the earth, and held on with his teeth though we pulled him along over the stubble on his back, and never let go until we had jerked him plumb over a fence.

I've been in all sorts of camps — military camps, hunting camps and camp meetings, but never dreamed of such a thing as a *balloon camp* before ! By the help of some farmers we filled the great basket with stones and then pitched a tent and made a fire at a safe distance. Lines were run to trees in three directions, loosely to give the balloon "play" in case of much wind, and then we all lay down in our blankets and tried to sleep.

At the very first signs of dawn we were up, and there she stood in the still air just like a vision. At sunrise a hospitable farmer invited us to breakfast, and wasn't it good ? I'll never forget that coffee.

By eight o'clock quite a large number of country folks had reached the field. Teams were hitched all along the fences. Now the Professor announced that as he wished to make a long trip that day, he should carry plenty of ballast and so could allow only two persons with him. It had been agreed that we should draw cuts, and this was done good-naturedly. The

choice fell upon a photographer, and the writer.

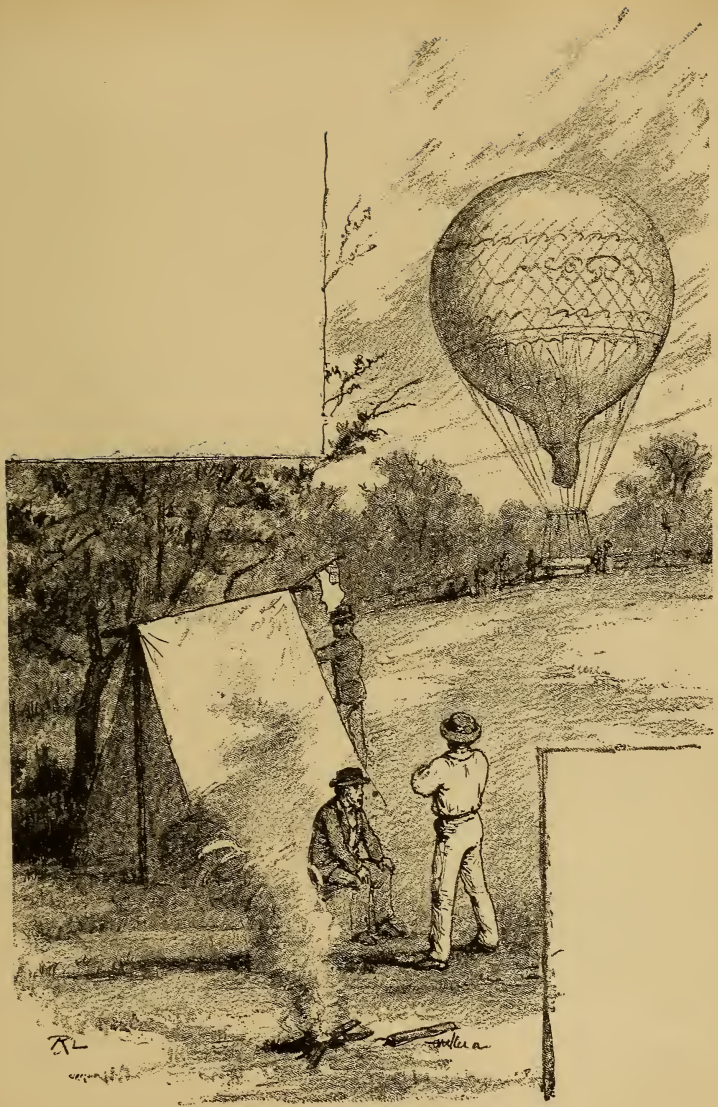
We were sorry indeed to leave our companions behind us, but there was no help for it. So we took our seats in the basket, said good-by, and were off.

Now we went up! *up!* UP! passing through a thin cloud that made everything below look dim and distant. We were in the region where *November spends the summer*. Whew! how chilly it was. We wrapped our overcoats and blankets close about us and our teeth chattered. Then we rubbed our hands and faces. Why! how queerly they looked and felt.

"Ha! ha! look at the Professor's face. Why! there *ain't a wrinkle left!*" said the photographer.

And so it proved. The aneroid told us that we were over three miles from the ground, and the atmosphere was so diminished in pressure that the internal forces of the body pressed outward and made the skin full and smooth.

One of yesterday's party had provided some large envelopes with long red tails of tissue paper to drop into towns, and we wrote messages and enclosed them in some of these, putting sand in one end, and launched them. We watched them as they shot hither and yon in their swift flight toward the earth. The chance finder was requested to send the contents



OUR BALLOON CAMP.

to the nearest telegraph office, but we never heard from any of them, save one.

About noon we found by comparing our maps with the streams below that we had passed into Pennsylvania; and not long afterwards we descried Oil City set upon the creek, with all its hills covered with derricks and oil tanks.

Speaking of Oil City, reminds me of a rather funny incident: For a couple of years I had been in correspondence with a young man who resided there, and who was also a journalist. His name and mine were just the same. I had promised faithfully to stop and see him at any time chance might bring me near his home. I took one of the envelopes and wrote a *regret*, dropping it over the city. It was picked up in the road and handed to him, but he always insisted that I had broken my promise unreasonably.

At the rate in which Oil City was left behind we knew our pace was very rapid, though to us it all seemed like a dead calm, for we kept just even with the wind.

The Professor said we could reach New England by midnight if the wind held and it didn't grow cloudy; but alas! for the past hour we had been watching a little fleecy nebulous bit of mist that seemed, like a

spirit, to spring from the nothingness of the blue ether, growing constantly, and attracting other cloudlets which came toward it from all quarters of the heavens and were swallowed up. A growing, whirling wall of pearly gray mounted and spread its shadow over half the earth.

We threw out sand and mounted above it. Then it arose toward us again. It seemed as though we could reach our hands into its surging depths. Over went seats, baskets, the tent — everything we could spare, and I'm not sure the Professor didn't glare at one of his companions with malicious and deadly intent.

The truth rushed upon us that we were racing with a storm.

It was of vital importance to keep in the sun, for the moment the shadows below could place their chilly spell upon our steed, the gas would chill and condense, and we would drop! drop! swiftly to the earth. At last it came, and we knew it was inevitable. Below us we could hear the crashing of thunder reverberating away into the depths of the black storm masses, and the lightnings every moment lit the weird scene with a grandeur but few mortals have ever witnessed. For a brief moment we hung

suspended like Mahomet's coffin in the centre of a great cave of pearl. Shall I ever forget that glimpse of heavenly splendor? A single shaft of sunlight broke through its walls and then died like the last ray of hope. Then downward we rushed! A mile nearer earth within the first minute! As the air grew denser we fell more gradually. Our long drag-rope was out, weighing perhaps three hundred pounds. Now we were closely enshrouded by leaden clouds. The rain ran down the bag in rivulets and trickled upon our heads.

"Look, oh look!" cried the Professor.

We were now below the storm, and along its dense ceiling could see its broad extent. We were above the mountains. No towns nor even houses could be discovered, only dense forests, through which the gale howled as among the rigging of a ship upon a winter sea.

Very quickly our drag-rope touched the tree-tops and began to glide among the swaying pines.

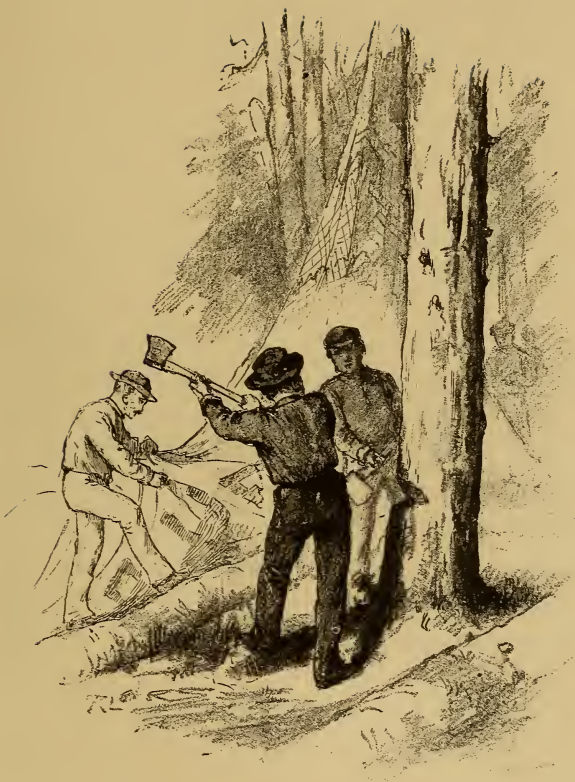
"Hold on at life-ropes!" shouted the Professor, knife in hand.

In another instant the basket gave a dreadful surge; a mass of pine boughs swept about our heads, followed by a strong jerk. The Professor had cut the

cord which bound the anchor coil. The anchor had dropped and caught among the limbs. We were safe! No! not yet.

The line must be shortened so we could clear the tree-tops. All three tugged at the rope. Then other lashings were made while the great aerostat plunged about like a wounded leviathan. We were eighty feet from the ground. Two of us found it convenient to go down the drag-rope, but the poor Professor, tall and heavy, preferred to try the tree. This was wet and slippery, as well as full of projecting points of broken branches. About twenty feet from the ground the Professor's clothes caught. He was in a great dilemma.

THE PROFESSOR'S DILEMMA.



THE WRECK OF THE "BUFFALO."

Amid a good deal of laughter we managed to liberate him, and as he reached the ground he exclaimed: "Well, of all the scrapes I was ever in, this is about the meanest!"

But help came even here. Far down the slope we heard a shout, which you may be sure was quickly answered. Then, after a while, the bushes parted and a half-score of woodsmen carrying gleaming axes ran to our aid. They were all thoroughly wet, like ourselves.

"What can we do for you?" they asked.

"Cut down half a dozen of these pines. I want to save the balloon," answered the aeronaut.

Then you should have seen the chips fly! Down came the trees, one after the other, and finally the one to which our steed was lashed. The gas soon escaped through great holes torn by the limbs, and our gallant craft was robbed of its power. Standing upon one of the fallen trees I made the sketch you see before you.

We found upon inquiring that we had landed in Potter county, Pennsylvania; and consulting our watches, found we had travelled one hundred and twenty-five miles in about two hours.

We were made comfortable at a lumberman's cabin,

and managed to get out of the woods in a couple of days where we could telegraph to our friends.

It cannot be denied that after the excitement had passed we felt very much like an old farmer who listened to our adventures. He said :

"Mebbe some folks prefer to travel in a flying Beelzebub, but I'm willin' to git along in a buck-board with a good road to put my feet agin when I git off."

You'll say, now, "I guess that race was enough for you!" But you're wrong; for I've had several trips since; and now you've a perfect right to retort, "Well! you are a bigger *balloonatic* than I took you for."

Perhaps you're right.

AUGUST'S "'SPERIMENT."

AUGUST *was* rather a troublesome boy. Generous and jolly, — his playmates called him a firstrate good fellow, but older people complained that he was curious, meddlesome, and always "cluttering round."

But here is mamma's opinion:

"August was born to be busy. He is inventive too. He asks questions to gain information, and he handles things to see how they are made."

"What is he tinkering at now, mamma?" asked Tom. "He has got hold of an old, old book, full of *f ss*, and all yellow; he's rigged two pans in a barrel, and bought a naptha lamp, and locked us all out of the attic."

"And he just came in with a covered basket, mamma," said Katie, 'carrying it ever so carefully.

I was jumping rope in the hall, and he asked me not to joggle. What do you suppose he was doing, mamma?"

"Suppose we wait till he tells us," said mamma, smiling.

"He's only trying some of his 'speriments," said wise little Robbie, aged five.

After the children went out, mamma took up her work and sat down by the window, watching the three outside, and waiting for her oldest boy, August, who presently came to take her into his confidence.

"Mamma, I am trying an experiment."

"And is that something new, August?" with an encouraging smile.

"But the *kind* is new, mamma. Did you ever hear of Réaumur?"

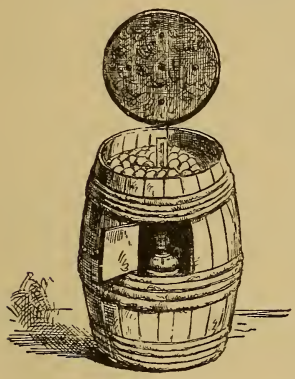
"Who wrote that curious old book on the art of hatching fowls by artificial incubation? Yes, August."

"Then will you come and see, mamma, what *I* have begun to do?"

He led the way, two steps at a time, to the attic. When they reached the door, August drew from his pocket a key, and unlocked it and led his mother in.

A flour-barrel stood in the centre of the floor,

closely covered. August removed the cover, and lifted up a piece of carpet. His mother looked in.



THE INCUBATOR.

Within the barrel was suspended a large, deep pan, resting on three iron cleats. This pan was partly filled with hot water, and floating on the water was another pan — a shallow one — which contained a layer of sand an inch deep. Over this was spread a piece of linen cloth, and in the cloth thirty-six large Brahma eggs lay closely packed. In the center stood a neat thermometer.

"You have made your arrangements very neatly, August," said mamma. "Of course I do not understand them exactly."

"Well, you see, mamma, this shallow pan gets its heat from the water beneath it. I put that in hot, and keep it just right with this lamp."

Saying which, he knelt in front of the barrel, and opened a neat little door, fitted with a brass knob and hinges.

Stooping down and looking in, his mother saw on

a tall flower-pot, which stood upside down, a naptha safety-lamp sending forth a small, steady flame.

"That keeps the temperature about equable;" said August, "but I have another lamp, larger than this, to use in case my incubator grows too cool."

"When did you set them?" asked mamma.

"This morning."

"To-day is the first of March: then if no accident happens, and the eggs are good, you expect them to hatch on the twenty-first?"

"Yes, mamma, and the eggs are all right because I told Grandma I wanted some *very* fresh, and she saved them for me."

"Did Grandma know of your experiment?"

"Oh! no, mamma. Not a soul but you knows about it; and I want you to keep the secret until we know how it will turn out."

"Very well!" said mamma; "but if you lock the door you had better leave the key with me in case anything should happen. I will look at your incubator occasionally while you are at school."

August gave his mother a grateful look — he felt so encouraged by her sympathy.

"How warm do you keep the eggs?" she asked as he carefully replaced the carpet and cover.

" Réaumur says at 32°, that is about 103 1-2 *Fahrenheit.'

" Must the eggs be kept at that temperature all the time?"

" No, only through the first week. The second it is a little less and the third still less."

" There is the luncheon-bell, dear; we must go down or the children will be trooping up here. I hope, my boy, that you will succeed."

" If I don't I shall try again," said August. Then, taking a final look to see that the thermometer and lamp were all right, he locked the room and they went down.

He paid several visits to the attic during the day and evening, finding on each occasion that all worked well and steadily. Before going to bed he refilled the lamp, so the supply of naptha shouldn't be exhausted; then he went to sleep and dreamed all night of eggs and chickens.

In the morning he was up and at his incubator before any one else was stirring. The thermometer indicated that the eggs were a trifle cool, so he turned up the wick of the lamp. Before going to church he turned the eggs. This he did twice daily, being care-

*Fahrenheit and Reaumur were both inventors of thermometers. Those commonly in use are Fahrenheit's.

ful not to jar them. The incubator worked well all day and all night.

The next day was Monday and he had his school duties to attend to. He left everything in good order, took the attic key to his mother, and went off to school full of confidence.

Alas! When mamma went up at ten o'clock, she could scarcely see across the room. Everything was black with soot. The naptha lamp was smoking fiercely.

The first thing was to get the window open, and put out the lamp. Then mamma looked at the eggs. Alas, again! There they lay covered with fine black soot. She took up one and tried to wipe it, but succeeded only in making a smirch which she could not wipe off. She knew then that the eggs were spoiled.

In the midst of it all August came in from school having been dismissed early. Poor August! He could scarcely keep the tears back.

"Well, August," said his mamma very practically, "I don't think a naptha lamp just the thing. They are very apt to smoke, and they are very inflammable."

"Yes," said August, trying to be cheerful. "Failure the first! I shall try it again. Grandma will give me some more eggs. I've only lost three days."

"And *I* will go to town this afternoon," said his mother, "and see if I cannot find a lamp which will be more reliable."

There was no school that afternoon, so August cleaned the room, and supplied the incubator with fresh eggs, greatly encouraged by his mother's sympathy and interest.

The other children were curious enough to know what was going on in the attic; but they could get no information.

Toward evening Mrs. Grant returned from town, bringing for her little boy a large tin lamp which would burn kerosene. He lighted it and adjusted the wick to just the right height. Then it was placed within the barrel to warm the second setting of eggs.

Day after day August and his mother watched and tended them. Everything progressed finely.

On the next Monday the eggs, having been in the incubator a week, were far enough advanced to be tested. At a south window there hung a heavy green Holland curtain. In this mamma allowed August to cut a hole, a little smaller than an egg, and she herself staid to assist him.

When all was ready, she handed August the eggs one by one. One by one he held them to the aperture. The first seemed quite transparent. In vain

August turned and turned it — there was nothing to be seen but the yolk floating at the top. With a sigh he laid that aside and took up another.

"O, mamma, look!" he cried excitedly.

Mrs. Grant examined it with great interest. Not only could she distinctly see the dark form of a little chick, particularly the head with its immense eye, but bright blood-veins were also plainly defined, branching out in all directions from the body. Another and still another of the eggs looked like this one. August was greatly excited.

"They are lively enough!" he said. "See, mamma, this one moves, and this!"

Then came one that was dark and shaky. "Addled," pronounced August. After this a number more appeared as promising as the former ones.

Finally all were tested. They were pleased enough with the result. Three were clear — that meant there were no chickens within the shells; one was addled; and thirty-two contained live chicks.

August was so wild over this discovery that his hands grew unsteady, and he unfortunately dropped two of the eggs and broke them. This left him but thirty likely to hatch; but these were all very promising.

"I am sure we will succeed now, mamma," cried August gaily.

"It looks like it, certainly," said mamma.

But alas for poor August's bright hopes! and alas for the expected chickens! Whether August was too confident and grew careless, or whether it was one of those unforeseen accidents that *will* happen, will never be known; but this is certain, that the next morning when August went, later than usual, to look at his incubator, he found the thermometer had gone up to 110 and must have been at that temperature some time, for in egg after egg, which he opened in despair, was a poor little dead chick.

Even if a boy is fourteen years old, he cannot help crying sometimes over a great disappointment.

Poor August put out his lamp with sorrowful breath and some of his tears fell upon the hot chimney which hissed as if in mockery.

Then he locked himself in his own room, threw himself on the bed, refused his breakfast and gave way to his grief.

Tom, Katie and Robbie all tried to get at him, but without avail. Katie coaxed with loving words. Robbie murmured, "Poor Gussie!" Tom said "Never mind, old fellow, if your 'speriment has failed. Come and play ball."

August's reply was not very polite.

"My experiment hasn't failed, and that is all you know about it, Tom!"

But the word "fail" seemed to rouse him, to restore his courage; for presently unlocking the door and coming out, he said quietly to himself, "I shall just go down to Grandma's for some more eggs — that's what I shall do!"

Grandma was curious to know what he did with so many eggs; but she asked no questions. She had great respect for August and his 'speriments.

She only said, "This makes one hundred and eight eggs, child. Now, if I had set all these, and if they had all hatched, what a lot of little chickens I would have had!"

"Ah!" thought August. "If! —" And he drew a long sigh.

Mamma, meanwhile, had been up to the attic to look at the incubator, knowing nothing of what had happened. Great was her amazement to find the lamp out, a basin full of broken eggs and little dead chicks, and the incubator itself deserted and empty.

"Why, August!" she cried, as she met him in the door with a basket of fresh eggs. "What has happened, dear child?"

"Only failure number two;" he answered, trying to

speak cheerfully, though even yet the tears lay high. "They got too hot in the night, mamma."

"Yet you are not quite discouraged?" said mamma.

August held out his basket with a smile.

So once more the incubator was set.

"We must take more pains this time," said mamma.

"Yes'm," answered August, "I'll try not to let any thing happen to these."

Things did work more smoothly this time. The temperature was kept about right, the eggs were tested successfully and without accident.

One week, two weeks, two weeks and a half, and then things happened again, things which came near being serious enough. It was Saturday afternoon. August was going with the other children to a circus. He had turned the eggs carefully and sprinkled them lightly with warm water. He had admitted the children into his secret, and they were all in the room waiting for him.

"These eggs are a little cool," said August, putting one up to his cheek. "I must leave them just right, I think I will fill the lamp and turn it up a little. Tommy, will you take the lamp out?"

Down on his knees Tommy went, and drew out the lamp which he set on the floor. Then, kneeling still above it, he blew hard, directly down the chimney.

"PUFF! BANG! *Crack!*" went something, causing August, Katie and Robbie to start violently, while poor Tommy, with his hands to his eyes, rolled over on the floor with a groan.

"Mamma, oh! mamma!" screamed Katie, "the lamp is 'sploded!"

"And Tommy's killed!" shrieked Robbie.

Mamma flew up the stairs and to Tommy.

"Oh! his eyes!" she cried. "Quick, August, water!"

"Oh! my poor Tommy!" sobbed little Robbie. "See him all b'eedin', b'eedin'!"

August came running with the water, and knelt down and held the basin while Katie flew for a sponge and soft linen.

When the blood was washed off, and his smarting eyes had been bathed with fresh, cool water, Tommy discovered that he had been more frightened than hurt; and mamma and the rest were greatly relieved to find his worst wound, a slight cut between the eyes, could be cured by court-plaster.

It was a great wonder, however, that more harm had not been done; for when the child blew so forcibly down the chimney, the wick shot up out of the lamp and the chimney shivered in pieces; one of the pieces had struck his face, making the cut, while the

hot air and smoke flashing into his eyes caused them to smart fiercely. August had neglected to fill the lamp at the proper time, and the oil had burned nearly out. It was the sudden forcing of air down the tube which caused the explosion.

"I thought you said 'twas a safety lamp!" said Katie indignantly.

"'Tisn't half so good as our un-safety ones;" declared Robbie.

"It's never safe to blow directly down upon a full flame in any lamp," said mamma. "The wick should always be turned down first and the flame gently blown."

"Accident the third;" said August ruefully. "Mamma, do you feel like trusting me any farther?"

His mother smiled. "The usual experience of inventors, my son."

Sunday passed quietly Monday with its school duties was well over. Tuesday morning — "Three weeks to-day!" said August, and half fearfully opened his incubator.

"*Peep! Peep! Peep!*"

The lad trembled with excitement, and a flush of joy spread over his face. He could hardly believe his ears. "One, two, three," he hurriedly counted, "four, five. six." On he counted, up to twenty eggs

chipped or cracked. One chicken was half out of its shell, and one, quite independent, was scrambling over the rest of the eggs.

August held his breath and looked at them as long as he dared to keep the incubator open. Then softly closing the lid, he rushed down stairs.

"Hurrah! Hurrah!" he shouted at the door of his mother's room. "They're hatching, mamma! They're hatching!"

"Are they, really?" asked mamma, pleased enough, and she hurried up the stairs, closely followed by the children, whom August's joyful cry had aroused from their sleep. In great excitement they clustered around the barrel.

"Oh! what a cunning, fluffy one!" cried little Katie, as she spied the oldest chick.

"But what is the matter with that other one?" asked Tommy.

"He has just left the shell and is not dry yet," August explained. "As soon as he is dry he will be downy like the other."

"Hear em say '*peep! peep!*'" cried little Robbie, grasping the edge of the barrel with both hands, and stretching his short legs to their utmost extent in order to get his eyes high enough to look over the edge.

"What lots are cracked!" said Tommy. "Oh! August, here is one cracked all round."

"Yes," said August, "that chick will soon be out."

Even as he spoke the shell parted, and a third little bright-eyed chicken struggled out and looked about in amazement.

The children could have watched them much longer with great interest, but mamma was afraid the incubator would get too cool, and she advised August to cover it.

"How *do* they do it, mamma?" asked Katie.

"The little chick is packed very wonderfully in his shell," said mamma. "His head under his wing, legs folded up with the feet toward the head, his bill coming out from under one wing. This bill is furnished with a little hard point on the top. When he is ready to crack the shell and come out, he begins to move. He turns his whole body slowly round, cracking the shell as he goes, by pressing with his whole force against it, the hard, sharp point on the top of his bill coming next the shell. When he is a few days old this hard point drops off.

How the chicken is packed.

How the shell is cracked.

Just before he hatches, after the egg is cracked all

around, he frees his head from his wing and struggles to stretch himself. Then the shell parts and he gets his head out, and presently his legs, one after the other. I forgot to say that just before hatching he gradually absorbs the yolk of the egg into his body, and that nourishes him for twenty-four hours after hatching."

"It's very curious, isn't it?" said Tommy.

"I didn't know anything but hens or ducks could hatch eggs," said Katie.

"Why, Katie!" exclaimed August, "there is a place at Canton, in China, where *thousands* of ducks' eggs are hatched artificially every day. There are twenty-eight rooms to the establishment, and all along the sides of these rooms are rows of sliding trays filled with eggs. These eggs are put in the first room the first day; on the second day they are moved to the second room; and so on, until they hatch in the last room. The heat is graduated, the last rooms being cooler than the first. All these eggs are hatched by the heat of the rooms."

"If they hatch thousands every day," asked Tommy, "what do they do with the little ducks?"

"They hatch them for the people in the neighboring towns," replied August. "The Chinese are very fond of ducks and ducks' eggs. A gentleman who

has been to Canton, and seen the hatching-rooms, told me he had seen people take eggs there to be hatched. They would pay for the hatching and then one of the men in charge of the rooms would count their eggs, and give them just as many little ducklings."

"I guess they don't have accidents there, then," said Katie.

"*I* won't have accidents *always*," August replied.

"But what *do* they do with so many ducks?" asked Tommy.

"Why, half the poor Chinese people near the coast live on the water all the time in boats that are half houses. Of course they could not keep hens, but they can keep ducks and they do."

"Oh, yes!" cried Tommy. "I 'member how papa told about seeing them fed and called into the boats. He said every flock knew its own call, and would go scuttling through the water to the right boat. He thought they were in this d'edful hurry, cause the last one got whipped."

"What shall I do about school, mamma?" August asked.

"Oh! go, and recite your most important lessons," she answered wisely. "I will take care of the eggs and chickens till you return."

It was just as well for August to be occupied, since the hatching, although it went on surely, was slow work.

With great faith in his incubator, August had previously built a little yard for the expected chickens.

It was in box form, about eight feet long and two feet wide. In the center was a feeding-tray and water tank, and at one end a hover. This hover (H) was

THE ARTIFICIAL MOTHER.

lined with soft fur loosely tacked to the top and sides and hanging down the front in narrow strips to form a curtain. It sloped from the front to the back. The water tank was a stout earthen bottle in a saucer; a small hole near the bottom of the bottle let the water, drop by drop, into the saucer, so that as the chickens drank, the supply in the saucer was continually freshening. The bottom of the yard was covered with gravel three inches deep. This neat yard was now waiting down stairs in a sunny shed room to receive the chickens.

August went to school, and on his way home called for his grandmother to go up to the house to dinner.

Grandma knew that it was just three weeks since August had taken the last eggs, and that twenty-one days was the time allotted by nature for the bringing forth of chickens, so she shrewdly suspected what she would find; but it had not occurred to her that she would find chickens alive without the aid of a hen.

"Grandma," asked August, as they walked along "when you set a hen on thirteen eggs, how many do you expect will hatch?"

"I hope for all," she replied, but I seldom get all. I think ten out of thirteen is a very good proportion."

"My incubator beats your hens!" thought August.

When they reached the house he took her straight to the attic.

"Well, I never!" she exclaimed. "So that is your secret, August! Well, I declare! And it really hatches the eggs, doesn't it? I always knew, child, that you would invent something wonderful."

"I didn't *invent* much," he said modestly. "In 1750, Reaumur, the French naturalist, gave an account of his experiments in hatching eggs in barrels set in hot-beds of horse-manure; and the Chinese and the Egyptians have hatched them for ages in ovens."

"But this is by hot water and lamps," said Grandma.

"Yes," said August, "I never saw an incubator be-

fore I made this; but, Grandma, I had read of them made on the same principle."

"At any rate," said Grandma, "I think that you deserve great credit for patience and ingenuity."

By evening thirty chickens were hatched from the thirty-six eggs. The other six gave no signs of life. By Grandma's advice they were left in the incubator "to give them a chance," but they never hatched.

The next morning all the members of the family took the chickens down-stairs, even Robbie, who took two in a basket, and deposited them in their new home.

Then their food was prepared, the yolks of hard-boiled eggs crumbled up fine, bread crumbs, milk, and a little fine cracked corn. After a few days they could be fed almost entirely upon the cracked corn.

The whole family then stood around the yard admiring the brood, thirty little, bright-eyed, yellow, fluffy balls. They soon learned to eat and to drink, and were busy, happy little creatures. They would run under the hover when they wanted warmth or quiet, just as naturally as they would have run under a mother hen. The box was built on castors, and could be rolled from window to window, and thus kept in the sunlight, in which the little creatures reveled; and at night it could be pushed near the stove. Of course August had to renew the gravel very oft-

en, and he was very particular to keep the food dishes sweet and clean. When the weather grew warm enough the yard was rolled into an open shed, and they could run out of doors.

These chickens were considered very wonderful, and many visitors came to see them. They grew fast and were as tame as kittens. Day after day the children came to feed the pretty pets, bringing them young clover tops and tender grass. Katie treated them with her birds' canary and hemp seed. Robbie gave them bits of his cookies and cakes. Anything that the children liked to eat, these little chickens liked also; and when they heard the little boots coming towards them they would perch on the edge of their yard and chirp and peep and coax for their dainties.

By and by their wings began to grow and the fluffy down was changed to feathers. Grandma said that now they must have meat occasionally, chopped up fine, and they had it Wednesdays and Saturdays.

The little creatures were frantic for the meat. They would fly upon August, and, if they could get there, into the dish, which they more than once overturned.

When their plumage was well out they were handsome fowls. August built a large coop and out-door yard for them, but they were not often confined in it,

for the children loved to have them about with them, and watched them as carefully as a hen mother could have done; and great was the joy of Katie and Robbie as they ran to their mother to report the first crowing of the little cockerels.

When last I saw them they were well grown. The pullets, August proudly informed me, were laying.

It was the glorious Fourth. Torpedoes were the order of the day, and Katie and Robbie were amusing themselves by throwing the snappers in all directions, and seeing their feathered pets run to eat what they could never find. The other fowls, disturbed by the noise of the day, preferred to keep hidden away in their houses, but these liked to keep about with the children and see the fun.

August began his experiments when some of my young readers were quite little children. He has continued them through several seasons, until now, after much study and patient industry, he has enlarged and greatly improved his incubator. He has changed its form entirely, and has attached an electric apparatus which regulates the heat, and avoids all danger from smoke. He has applied for a patent, and has made arrangements for taking care of a large number of chickens as early as February, being still greatly interested in this successful "'speriment."

SOMETHING ABOUT LIGHT-HOUSES.

YOU have all heard of the Seven Wonders of the World; did you know that two of these wonders were veritable Light-houses?

About 300 B. C., Cheres, the disciple of Lysippus, cast the famous brazen Colossus of Rhodes, a statue of the Sun God Apollo, and erected it at the entrance of the harbor where it was used as a Light-house, the flames which crowned the head of the Sun God by night serving to guide wandering barks into his Rhodian waters.

For eighty years its hundred brazen feet towered superbly above port and town, and then it was partly destroyed by an earthquake. For nearly a thousand years the sacred image remained unmolested where it had fallen, by Greek and Roman, Pagan and Christian; but at last the Saracen owners of Rhodes, caring

as little for its religious association as for its classic antiquity, sold the brass of it for the great sum of £36.000, to the Jewish merchants of Edessa.

Just about the time that the Colossus was set astride the Rhodian harbor, King Ptolemy Philadelphus caused a noble tower of superb white stone, four hundred feet high, to be erected by an architect named Sostrasius, son of Dixiphanes, at the entrance to the port of Alexandria, which was a bran-new busy city in those days, a mere mushroom growth in that old, old Egypt, where the upstart Ptolomies were reigning on the throne of the Pharaohs.

It is said that this Sostrasius didn't want his own name to be forgotten, so he carved it deep in the stone of the tower and covered it over with plaster whereon he inscribed by royal command:

"King Ptolemy to the Gods, the Saviours, for the benefit of sailors."

Josephus tells us that the light, kept burning on the top of this Pharos, as it was called, probably from a word that signifies *fire*, was visible for forty miles at sea. For a thousand years it shone constantly until the Alexandrian Wonder likewise fell a prey to time and the Saracens.

The words Pharos-Phâre, Faro, etc., have been adopted into more than one European language to express Light-house or sea-light.

FOURTH ORDER LIGHT-HOUSE, AT PENFIELD REEF, L. I. SOUND.

Some persons suppose that great mirrors must have been used to direct the light on the Pharos and keep it from being lost, but it is most probable that no more effective means of illumination than a common fire was employed.

The only other Light-houses of antiquity of which any record has been preserved are the Tower of Conira in Spain, which Humboldt mentions as the *Iron Tower*, and a magnificent stone Light-house at Capio, near the mouth of the Guadalquiver, that Strabo tells us about, on a rock nearly surrounded by sea.

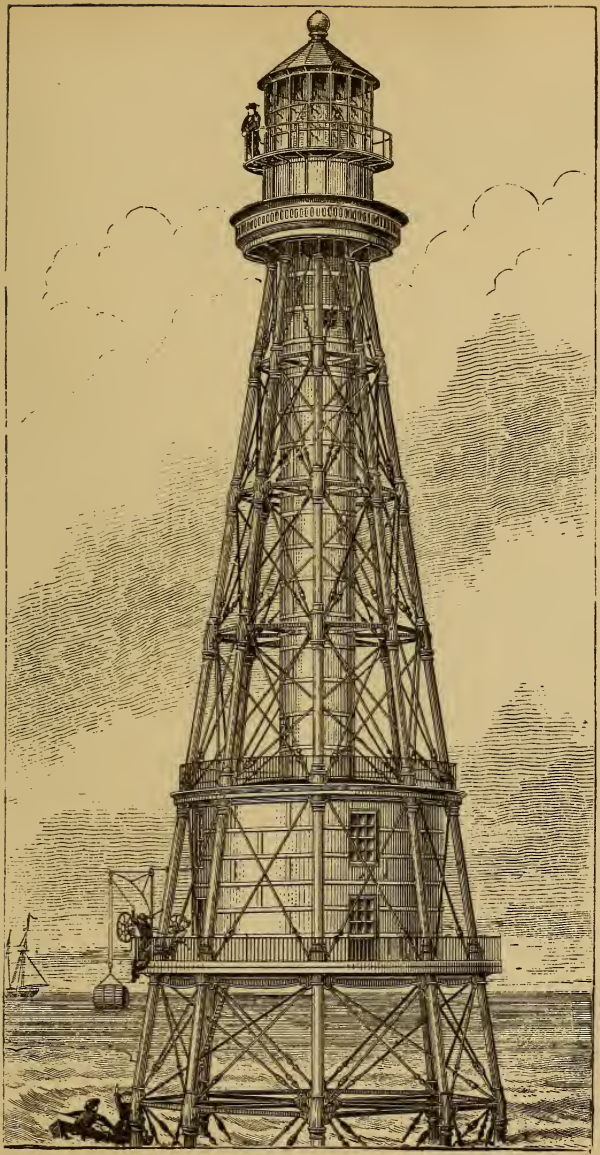
Then tradition points out Cesar's Altar at Dover, the *Tour d' Ordre* at Boulogne, a Roman Pharos at Norfolk, and, in early British history, St. Edmund's Chapel at the same place, as having been originally intended for sea-lights.

Though we are far ahead of our forefathers in our scientific apparatus for illuminating Light-houses, we have never equalled them in magnificence of architecture ; for, in point of grandeur, the *Tour de Corduan* at the mouth of the River Garonne, in France, is probably the noblest edifice of the kind in the world, and it is nearly three hundred years since it was completed under Henry IV., having been twenty-six years in building.

All these centuries it has stood strong on its great reef, and has served to guide the shipping of Bordeau and the Languedoc Canal, and all that part of the Bay of Biscay; and it promises, in all human probability, to show its steadfast light for centuries to come.

Corduan is stoutly built in four stories, each of a different order of architecture, highly ornamented, and adorned with the busts of the Kings of France, and of the heathen divinities. The first story contains the store-rooms, the second, the so-called King's apartments, the third a chapel, and the fourth the dome or lower lantern. The tower completed is 197 feet high.

When this splendid structure was completed no better method for illuminating was known than by burning billets of oak wood in a chauffer in the upper lantern; and it was considered a great matter when a rude reflector in the form of an inverted cone was suspended above the flame to prevent the light from escaping upward. It is not known, in fact, that any more effective mode of lighting was employed until 1760, not much more than one hundred years ago; and then the radiance was not especially brilliant as it would seem to us. At that time Smeaton the engineer began to use wax candles at the Eddystone Light



A Modern Light-house.

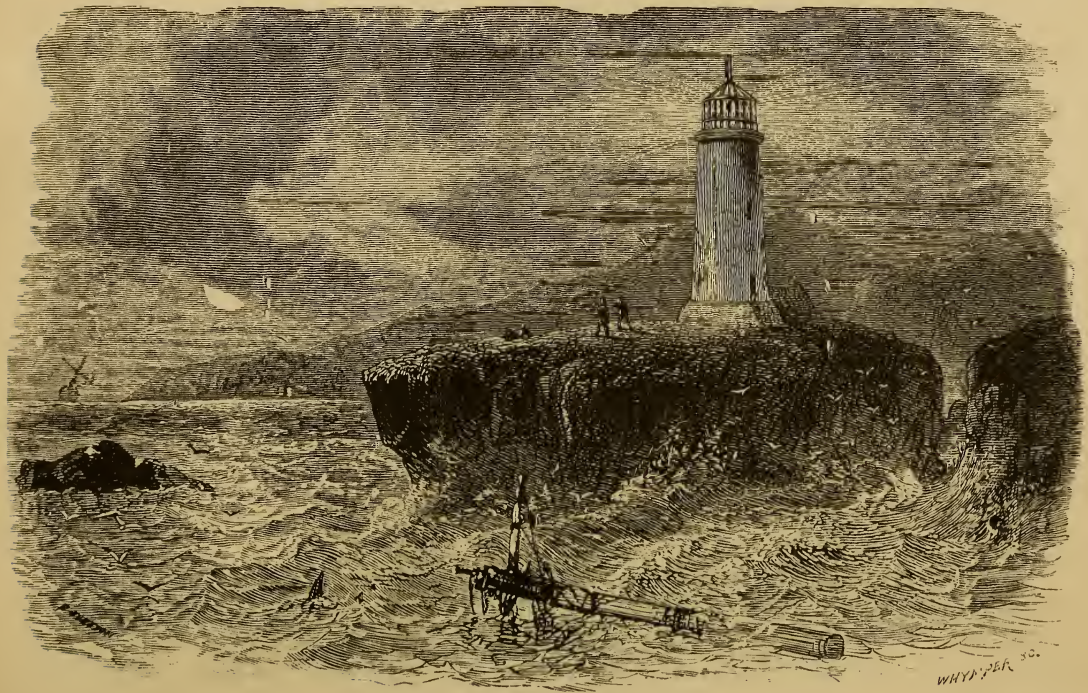
house, which soon degenerated to tallow dips, probably on account of the expense, and they must have given the keeper abundance of occupation in the way of snuffing and replenishing.

In 1789 a French scientist, M. Lenoir, made an epoch in the history of Light-houses, and in the progress of civilization as well, when he introduced an improvement in the way of lighting up the *Tour de Corduan;* for, of course, the comparative safety in coast navigation attained to by means of our modern Light-house system is of the first consequence in commerce and international communication, which means the spread of science, enlightenment and religion throughout the world. M. Lenoir placed Argand lamps with parabolic mirrors or reflectors in the lantern, which is, as it appears, a glass room on the summit of the tower entered by a trap-door at the head of a spiral staircase. Such a great change having been brought about, men of science have not rested content, but have gone on making one advance after another. In 1820 the famous diaptric instruments of Mr. Fresnel were placed in Corduan on trial, and proved such a grand success that, gradually, they have been universally adopted. The wonderful lens which you saw at the Centennial belongs to a diaptric refracting light of the first order, and oil lamps con-

structed on the Fresnel principle, and, placed with lenses of different orders, according to the Light-house they are used for, serve an admirable purpose. Lard is found to be the best illuminator, as a general thing, for the light it casts through lenses of the first order reaches as far out to sea as it is possible for any light to be seen on account of the convexity of the earth. Experiment has proved it safer than mineral oil, and it is cheaper than gas, which however is occasionally used near a city whence it can easily be obtained. Only in some few special instances electric light, the most intense procurable, is employed.

The Centennial birth-day gift of the citizens of France to the American Republic is a colossal brazen statue of Liberty, which is to be a Pharos to light the shipping of the world into New York harbor. It will stand on Bedloe's Island, and from the torch in its uplifted hand will flash a calcium light. Only the hand and arm were finished in time to be sent to the Exposition ; but these were on so gigantic a scale that a man standing in the little gallery which ringed the thumb holding the torch seemed like an ant or a fly creeping along at that height.

Sir Walter Scott — dear Sir Walter, whose " Tales of a Grandfather " and Scottish stories and poems were so delightfully familiar to the boys and girls of



Light-house on Mt. Desert, Coast of Maine.

the last generation, left a charming little diary of a voyage he made in the summer of 1814, on board a Light-house yacht, in company with the Commissioners of Northern Lights,—who have charge of the Light-houses in Scotland, as the Elder Brethren of Trinity House have of those in England,—their Surveyor-Viceroy, the engineer Stevenson, and a few other gentlemen.

The first Light-house they visited was an old tower, like a "border keep," still illuminated by a grate fire on top. The commissioners think of substituting an oil revolving-light; but Sir Walter wonders if the *grate* couldn't be made to revolve!

Next they came to Bell Rock, which, in olden times, was the terror of sailors feeling their way in and out of the islands and rocks and shoals of the beautiful, perilous coast of Scotland. Inch-cape Rock, as it was then called, had shipwrecked many a helpless crew before the Abbot of Aberbrathock, fifteen miles off, out of pity caused a float to be fixed on the rock, with a bell attached which, swinging by the motion of the waves, warned seamen of the danger.

Many years later, when Abbot and Monastery bells had all become things of the past, a humane naval officer set up two beacons on Bell Rock by sub-

scription ; but they were soon destroyed by the fury of the elements.

At last in 1802, people began to realize the danger of this terrible reef in the highway of navigation, and the Commissioners appointed Mr. Robert Stevenson to erect a Light-house on this point.

It was a perilous undertaking, and once the engineer and his workmen made a very narrow escape from drowning ; but it was successfully accomplished by the brave and skilful Stevenson. Sir Walter thus describes this famous beacon.

" Its dimensions are well known ; but no description can give the idea of this slight, solitary, round tower, trembling amid the billows, and fifteen miles from Arbraeth (Aberbrathock), the nearest shore. The fitting up within is not only handsome, but elegant. All work of wood (almost) is wainscot ; all hammer-work brass ; in short, exquisitely fitted up. You enter by a ladder of rope, with wooden steps, about thirty feet from the bottom where the masonwork ceases to be solid, and admits of round apartments. The lowest is a storehouse for the people's provisions, water, etc. ; above that, a storehouse for the lights, oil, etc. ; then the kitchen of the people, three in number ; then their sleeping chamber ; then the saloon or parlor, a neat little room ; above all the

Light-house; all communicating by oaken ladders with brass rails, most handsomely and conveniently executed."

In the course of the voyage Mr. Stevenson determined that his "constituents" should visit a reef of rocks called *Skerry Vhor* (Skerrymore), where he thought it would be essential to have a Light-house. Sir Walter's description of this visit is quite amusing and perhaps you would like to read it. The wind had blown squally all night, and in consequence everything and everybody were pitched and tossed about at a great rate, on board the little vessel. Nobody relished the attempt to land under these circumstances on this wild ridge.

"Quiet perseverence on the part of Mr. Stevenson, and great kicking, bouncing, and squabbling upon that of the Yacht, which seems to like the idea of Skerry Vhor as little as the Commissioners. At length, by dint of exertion, comes in sight this long ridge of rocks (chiefly under water) on which the tide breaks in a most tremendous style. There appear a few low, broad rocks at one end of the reef, which is about a mile in length. These are never entirely under water though the surf dashes over them. Pull through a very heavy swell with great difficulty, and approach a tremendous surf dashing over black pointed rocks —

contrive to land well wetted. We took possession of the rock in the name of the Commissioners, and generously bestowed our own great names on its crags and creeks. The rock was carefully measured by Mr. S. It will be a most desolate position for a Light-house — the Beli Rock and Eddystone a joke to it, for the nearest land is the wild island of Tyree, at fourteen miles distance. So much for the Skerry Vhor."

As might have been expected, the Commissioners were discouraged at the aspect of affairs and delayed the work from year to year, but at last, in 1834, the Board placed this serious undertaking in the hands of Mr. Alan Stevenson.

Mr. Stevenson has left us a thrilling account of his noble work on Skerrymore Rocks, than which no worthier monument was ever left behind to the memory of a gifted and conscientious man.

In the first place he had to build barracks for his workmen on the Isles of Tyree and Mull, and then to begin the foundation of the tower on the only one of the gneiss rocks of the reef which was broad enough for the purpose, and this is but barely so, for at high water little remains around the tower's base but a narrow band of a few feet of rugged rocks, washed into gullies by the sea, which plays through them almost incessantly.

LIGHT-HOUSE AT "THE THIMBLE SHOAL," HAMPTON ROADS, VA.

Everything had to be thought of and provided for beforehand; even so small a matter as the want of a little clay for tamping holes might have stopped the work for a time.

Piers were built at Mull where the granite was quarried, and all sorts of conveniences and contrivances for the vessels and tug in use.

The poor workmen suffered dreadfully from sea-sickness when compelled to live on their vessel, so they erected a temporary wooden barrack on the rock, but it was completely swept away in a November gale, destroying the work of a season in a single night. The dauntless men went to work again, however, and built another shelter which stood so successfully that it was finally taken down several years after the Light-house was completed.

Alan Stevenson tells us of their life in this wave-washed eyrie, where he was perched forty feet above the sea-beaten rock with a goodly company of thirty men, where often for many a weary night and day they were kept prisoners by the weather, anxiously looking for supplies from the shore. At such times they were generally obliged to stay in bed, where alone they found an effectual shelter from the wind and spray which searched every cranny in their walls. More than once the fearfulness of the storm drove the

more timid from their frail abode, which the sea threatened to overwhelm, out on the bare rock where the roofless wall of the Light-house offered a safer defence against the perils of the wind and waves.

Innumerable were the delays and disappointments which tried the courage and faith of Stevenson and his brave band. It was a good lesson in the school of patience, and they learned to trust in something stronger than an arm of flesh. More than once their cranes and materials were swept away by the waves, and the workmen left, desponding and idle. They incurred daily risks in landing and in blasting the splintery gneiss, and in the falling of heavy bodies in the narrow space to which they were confined. For all, they met with no loss of life or limb, and maintained good health in spite of being obliged to live on salt provisions for six summers.

But the hardships and responsibilities by no means end with the building of the Light-house; the keeper who has it in charge holds a most important position, for upon the skill of his hands in the management of the delicate costly lenses and machinery, the clearness of his head, and the courage of his heart, as well as his honesty and fidelity, depends, even more than upon the captain of a vessel, the safety of many precious lives and millions of property; so it is

of the first importance that he be intelligent, efficient and trustworthy.

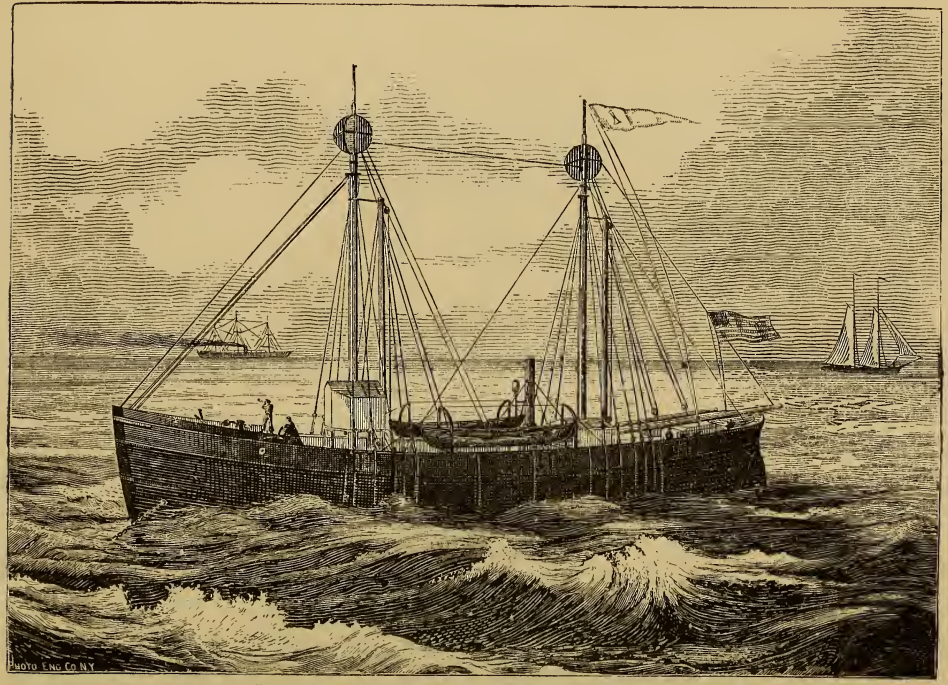
A Light which has been visible for years cannot be suffered to be extinct for one hour without endangering a vessel's safety. The failure to illuminate at the proper time might prove fatal to the confiding mariner.

In England it is a situation for life unless the holder prove unworthy, with a pension if superannuated; but in our own country the appointments are in a measure political, and consequently liable to be temporary. This circumstance is deplored by the Board which sometimes in this way loses valuable servants after they have gained a skill and experience which only comes with time; and raw, untried hands have to be placed in positions of trust. It is hoped that some change will soon be brought about in this matter.

A year or more ago a gentleman, who holds an important position in the office of the Light-house Board and is specially interested in the comfort and welfare of the keepers, came in the course of a tour he was making on one of the Supply Ships, which carry half-yearly stores to the different posts, to a very isolated Light-house off the Florida coast, twenty miles from any human habitation and sixteen from *terra firma*. Just before the arrival of the vessel a little child of

the keeper had died, and was about to be buried in the sea without so much as a word of prayer being said over it. Mr. —— was shocked to find that these poor people in their isolation seemed to have no idea of religion, and that there was not a book of any kind at the station. The parents made no objection to his reading the burial service over the poor baby, out of a little prayer-book which he happened to have in his pocket, and he went away determined to do his part towards making good the deficiency he had discovered; for on investigation it was found that very many Light-houses were quite as much cut off from books as the one he had visited, and one instance had occurred of a poor fellow who had actually gone crazy, from sheer mental starvation, in his loneliness.

Many persons have interested themselves in Mr.——'s scheme. An appropriation has been asked from Congress for supplying reading matter to the six hundred and more Light-houses along our coast; and in the mean time private individuals have sent in contributions in the way of old books and magazines. The lady and gentlemen clerks at the Light-house Board have been most kind and helpful in the matter; for they always feel an interest in the condition of the keepers and their families, and when cases of suffering come to their knowledge, as lately, when a keeper



First Class Light-ship, with Steam Fog Whistle.

at the South was burnt out and lost all his possessions, are prompt with their assistance. In this instance they helped to sort and arrange the motley piles of donated literature, which was then bound up nicely, in uniform volumes, at the Government Printing Office, and a neat little library-case of strong oak wood was made, fitted up with shelves and having heavy metal clasps and handles; and just so many volumes, always including a Bible, were placed in each case.

The Store-ships will now go out with a goodly lading of these supplies; one will be left at each station, and the next time the ship comes round the old case will be taken away and a fresh one substituted. In this way a circulating library system is established, and every Keeper well supplied with abundance of wholesome and entertaining reading matter.

You children, with your wealth of books and delightful magazines coming every month, can perhaps hardly appreciate the boon this kind thought, so well carried out, will prove; for you have never known what it is to be shut up in a lonely tower, day after day, month after month, with no outside interest or amusement. You can do your part towards brightening the lives of these men with their wives and children, and I am sure you will be glad of the oppor-

tunity. Many of you, no doubt, have piles of old magazines or story papers, or even of books, for which you have no farther use. Would you not like to put up a nice package of these, and send them by Express to the "Care of the Chief Clerk of the Light-house Board, Washington, D. C."?

New supplies are constantly needed, and in this way you could not fail to give pleasure to those who have little enough in a life of monotonous duty.

JOHN'S SCHOOLMASTER.

JOHNNY GILMAN was a bad boy. He did not like to go to school. Arithmetic was of "no account," history "no good,"

and geography he would learn by and by, by "trotting around."

A crisis came at last, and it was resolved that if he would not study with the boys he should not play with them, and he was shut up in the attic in solitary confinement. Poor John was miserable at first, but presently he began to look about for amusement.

Among the attic treasures he found a box full of old rusty coins which once belonged to his uncle Fred. John wondered why any one saved such old dirty pennies; but he idly began to count them, and then to look at the different heads they bore, and to read the inscriptions. He found the coins were of different countries, and to occupy his time, he selected the cents of his own country. Many of the coins were so covered with dirt and rust, that he could not tell their date; and while he was wondering what means to use to clean them, a servant brought his dinner, and through her he obtained some fine scouring brick and chamois skin. After dinner he went to work, and as the black coins began to shine out like new pennies, here a feature and there a date suddenly legible, the boy felt like the excavators

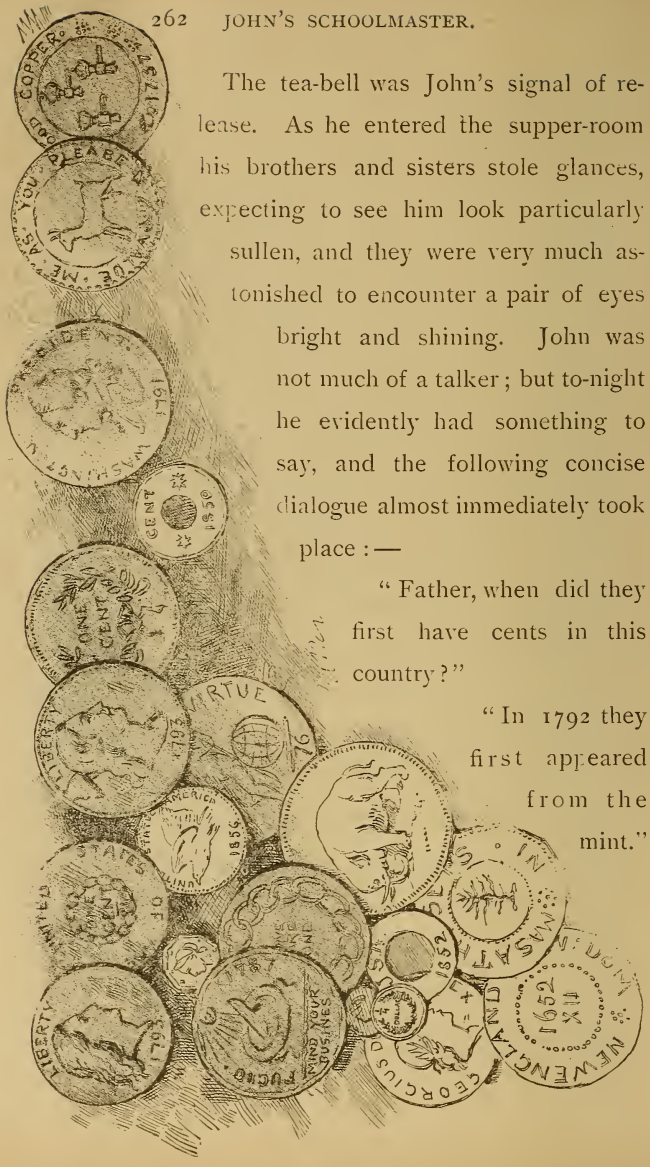
at Pompeii and Nineveh as they came upon the treasures of those long-buried cities.

The afternoon passed quickly away. Twilight found him still at work. Before him lay a row of shining United States cents, arranged according to date. The oldest bore the figures 1793. On one side was the head of the Goddess of Liberty, on the other side thirteen links. There were also cents of the same date when to the head of the Goddess was added the Liberty-cap, while the other side of the coin bore the olive-wreath of peace. With the succeeding years, the head of the bold Goddess with her flowing hair disappeared from the cents, and in its place was a finely chiselled head, with classic Grecian features and the hair bound with a fillet. The cents seemed to rejoice in this last device, and bore it proudly until the whole race of large copper cents disappeared in 1857, and into their places stepped the small nickel cent which had appeared the previous year; but this coin was crowded out in 1864 for the small bronze cent, which still holds the place of favor. John could find no cent of 1815, and afterward discovered that no cent was coined that year.

The tea-bell was John's signal of release. As he entered the supper-room his brothers and sisters stole glances, expecting to see him look particularly sullen, and they were very much astonished to encounter a pair of eyes bright and shining. John was not much of a talker; but to-night he evidently had something to say, and the following concise dialogue almost immediately took place: —

"Father, when did they first have cents in this country?"

"In 1792 they first appeared from the mint."



"Whose idea was it?"

"Two years before their appearance Robert Morris proposed the coin, and Thomas Jefferson gave it its name."

"Who was Robert Morris, and how did Thomas Jefferson happen to be the one to name it?"

"If you study the history of the United States as you ought, you will know all about them."

"Why was the head of the bold woman put on the first cent?"

"You are mistaken. The first cents bore the head of Washington; but it was the time of the French Revolution, and the enthusiasm of the French reached America, and caused them to change the noble head of Washington for that of the French Goddess of Liberty."

"What did they do for cents before that time?"

"They had English pennies, half-pennies and farthings. They also had copper coins of three times the value of King George's half-pennies. These were first made in 1737 at Granby in Connecticut, by John Higley, a blacksmith. On one side of the coin was the figure of a deer, and the

inscription, 'Value me as you please;' on the other side were three sledge-hammers, wearing crowns, and around the edge the inscription, 'I am good copper.'"

"Can you get me one of those first coppers?"

"Probably not; there are not a dozen in existence. Besides these there were colonial cents. There was the Fugio cent of 1787, which bore on one side a sun-dial, and below it the inscription, 'Mind your business;' on the other side were thirteen links, and the words, 'We are one.' There were the Massachusetts cent and half-cent of 1787 and 1788, the Connecticut cent first issued in 1785 and continued for four years, the Vermont cent of the same dates, the Virginia half-penny of 1773, the Carolina cent of 1694 bearing the figure of an elephant, the Louisiana cent first issued in 1721, and the New Jersey cent of 1786, 1787, 1788. On the New Jersey copper was inscribed the national motto, '*E pluribus unum.*'"

CROWN OF GEORGE IV.

"What does 'E pluribus unum' mean?"

"If you studied your Latin lessons as you ought, you would know. This motto appeared for the first time on a copper coin struck in 1786 from a private mint at Newburg, N. Y. In 1796 this motto was inscribed upon our gold coins, and was borne by our silver coins in 1798. In 1834 it disappeared from the gold coins, and showed that the gold was not the same number of carats fine as before. In 1837 the silver coins discarded the motto, but of late years the new silver dollar bears it again."

HALF-CROWN — WILLIAM IV.

"Why do you say gold is so many carats fine?"

"The carat is a small bean that grows on a tree in Central Africa; its weight is uniform, and thus it is used as a unit of weight for gold. Eighteen carats fine means that in every twenty-four carats' weight of gold there are eighteen carats' weight of perfectly pure gold."

John would have kept his father talking all of the evening, but he was called away on business, and the

boy retired to the library to find out for himself some of the things he ought to know.

The next morning when consigned again to the attic, he selected the English coins. Many of them bore the heads of the four Georges, then came the head of William the Fourth, and last of all, Queen Victoria. There were Canada coins bearing the heads of English sovereigns, and coins from India with the head of Victoria upon them. He did not understand about these last coins; and when he asked his father about them in the evening, he was briefly told that his geography and his history would give him the information.

GOLD FIVE-POUND PIECE — VICTORIA.

Among the coins John found one bearing the head of Constatine the Great, and wrapped around the coin was a paper, on which was written a history of this particular coin: "It was one of those found not many years ago in an old Roman camp in French Alsatia. Some laborers in digging came upon an old chest

which contained seventy-five hundred bronze coins from the mint of Constantine. These coins had probably been buried in the ground since before the middle of the fourth century, when the Roman legion encamped there." John's father hinted to him just enough of the history of this Roman Emperor of 306 to make the boy eager to know more of this first Christian Emperor, whose vision of the cross had led him on to victory.

BRONZE OF CONSTANTINE. 323 A. D.

John stayed in the attic three days; and the result was that the little copper schoolmaster inspired him with a new ambition, and he gladly went back to his studies at the Academy and became an industrious pupil. Some time after his marked improvement at school, his father gave him a large box of coins which uncle Fred had left to be given to John when he was old enough to appreciate them.

THALER OF FRED. WM. III. — PRUSSIA.

Upon opening the box, John's delight was great to find it full of silver coins, not only of America, but from nearly all the coun-

tries from which coins can be obtained. Some were finely preserved, and the heads and inscriptions as clearly cut as when they first appeared from the mint; others required much labor to bring out their hidden story.

Chemistry, which John once despised, he now made his servant; and by its aid he was saved days of labor in cleaning the coins. Each one of the rare old coins seemed to have a history, and John sought it out from books and scholarly men, who were pleased to help the young enthusiast. Coins bearing the head of Frederick the Great made him study the histories of Carlyle, Macaulay and Abbott, and he traced the growth of Prussia from the Marquisate of Brandenburg to its now vast dominions, for the story of its rulers was written on the coins from the first Frederick to the Frederick William IV. whose head shone out on that perfect specimen of a coin, *ein thaler* of 1856, and on to that last coin bearing the head of William I., King of Prussia. The head of Maria Theresa invited him to the study of Austria. The head of Napoleon and the old

PENNY OF WILLIAM I. — 1066-1087.

French kings led him to the study of France. A Mexican *peso* of 1866, bearing the head of Maximilian, urged him to the study of Mexico, and the story of the unfortunate emperor and the beautiful Carlotta thrilled him with an interest which sent him to the study of Belgium, not only in the past but in the present, eagerly searching for some news of the sorrow-stricken empress, who was still waiting for the dead emperor.

MEXICAN DOLLAR — 1866.

He found the earliest date on English coins was in 1549, during the reign of Edward VI. A William I. coin sent him back to 1066 and the early history of England. Specimens of the "clipped coins" made him rejoice when William set up the mint in the Tower of London in 1558, and the new "milled money" appeared, with the raised rim and fluted edge.

The coins of his own country inspired him with a feeling of patriotism. They whispered of the Revolution, when the head of King George disappeared from the cents, and Liberty became the inscription

on the coins, and the watchword of our land. The changes that the years wrought in the devices were of great interest. Romance also added its charm to some of the coins. His specimens of the pine-tree shilling, coined in Massachusetts when together with Maine it formed a province, chanced to belong to those given as a marriage portion to the daughter of John Hull, who was Master of the Mint in 1652, when the pine-tree shillings were struck, and who gave his daughter as many shillings as her own weight would balance in the scales.

The coins taught John not only geography and history, but the nickel five-cent piece taught him the metric system of weights and measures. Its weight being five grammes, two of the coins weighed a decagramme. Its diameter being two centimeters, the length of five was a decimeter. The measure of the length was also a guide to the capacity, as the kiloliter is a cubic meter.

The coins also led John to a study of metals, and of their distribution throughout the world, also to the different materials used as money in different ages of the world. He found not only gold and

silver and copper used, but brass among many nations. Indeed, it seemed the favorite metal of the Chinese, who had used it for thousands of years for their one coin — the *cash*. The old Lacedemonians and Carthagenians used iron, and Lycurgus even banished gold and silver, and made the cumbrous iron coins take their place. He found that not only metals were used as money, but learned of the engraved stones of the Ethiopians, the wampum of our American Indians, of the polished shells of barbarous tribes, and how once an attempt was made to coin oyster-shells into money in our own United States.

The study of the old Roman and other foreign coins, with the royal heads upon them, made the boy feel the lack of a similar history written upon the coins of his own country, and caused him to mourn that the coins had not continued to bear the head of Washington during his administration, and of every succeeding President during his term of office; then each of our rulers would have been commemorated, so that not only the youth of our own land, but those of foreign lands, might learn in this happy way of the presidents of our Republic.

John Gilman is no longer a bad boy. He has developed into a scholar, and he cherishes a secret hope of some day — not of being the President of the United States — but the Secretary of the Treasury, when he will use his power and influence to revolutionize the coinage of our country, and cause one set of coins, at least, to bear the head of the President then in power. Meantime, he already has carried out one invention. He would not keep his coins packed away in boxes; he wished them arranged in order, and the face of each to shine out in a suitable frame like the face of a friend. He questioned his father in regard to the arrangement of the great collections, but he was not satisfied with the idea of having them hung up in glass cases like those at the mint in Philadelphia, or of their lying down on velvet cushions as at the Museum in Edinburgh; so he devised a coin album, and obtained permission from his father to have some made to order. Now John's fine collection is arranged in these albums, which take up but little room as compared with glass cases.

CHINA.

"BUY A BROOM! BUY A BROOM!"

LAST summer while on our vacation trip along the sea-coast we made our plans so as to stop over a train at Barnstable that we might have time to take a look at that ancient burgh, but found to our dismay when it was too late, that of *time* we had altogether too much, for when we stepped out of the car it was seven o'clock in the morning, and our train would not leave till four in the afternoon! And to make matters worse it began to rain. We managed, however, at intervals when the rain held up, to get a pretty good idea of the place, but were driven back to the station by the persistent drizzle

long before noon; and there we seemed destined to spend five tedious hours, with not much of anything to do, except to get the way-bills of the Old Colony Railroad by heart, and commit to memory whatever might be available in the other advertisements posted on the walls.

We were beginning to be desperate, when my companion, strolling about, discovered a small placard saying that fruit was for sale in the freight depot. I set out to explore, having visions of apples and pears, but especially peaches and grapes before me.

Passing the wide freightage doors, I came to a narrow one which was wide open; so I first looked, and then walked in. It was an unfinished place where a slim young woman was busy about her housework, while a sick-looking man was "standing round." There was a cooking-stove, and she was taking pies out of the oven, which she set in a row on a cumbrous wooden bench that filled all the opposite end of the room, and under it were stored bunches of something unknown to me which I found afterwards was broom-corn. She was pretty and girlish, and had blue eyes, and fair hair.

She asked me to sit down, and told me they had been living there off and on for three years. "We

THE BLIND BROOM-MAKER OF BARNSTABLE.

used to live in 'Commons,' but we did not like, and so came up here. My husband is not well, and I go out washing, and take in washing."

It was a very queer place to live in, but neat and comfortable, yet it seemed just as if they might have been moving, and had merely stopped here over night and set up their stove in order to cook something to eat.

Upon inquiring for the fruit, about which it began to seem as if there must be either a mistake or a mystery for nothing of the kind was to be seen except the dish of apples left over from the pies, she directed me up-stairs; and up the steep narrow stairs I went, nearly stumbling over a great black dog (which she assured me would not bite) that lay stretched at the threshold of a dreary kind of room which had one occupant — a man with his shirt-sleeves rolled up to the elbows at work near one of the windows at the farther end. And now I remembered that we had seen him at his bench there as we sat in the depot, and wondered what he was doing.

No indications of fruit; but there were four machines and a stack of brooms, and the litter of shreds and waste, and I was about to retreat with an apology after making known my errand. He said I had

made no mistake, but he was out of everything except confectionery; peanuts, dates and figs. So as there were no apples, no pears, no peaches, no grapes, after all my perseverance, *dates* I would have, and he went to a closet where he said he kept them, holding his hands out before him in such a way that I knew he could not see even before he said, "I am blind."

After he had weighed them and received his pay, there were a few words about his business, which he seemed delighted to talk about, and because I put a question or two, he asked if I was a reporter, and said "that used to be my business. I was on the reportorial staff of the Pennsylvania legislature, when from overtasking my eyes, and other causes, I became blind. I went to the Institution at South Boston, and learned to make brooms so that I could earn my living."

He was full of interest in the work he had been compelled to fall back upon, and invited me to come in with my companion and see how it was done.

"Now I wish," said he, "that I had some stuff ready. I have to soak it before I use it. But your train does not go till four o'clock. I will put some to soak immediately, and if you will come in about

A GAY CAVALCADE.

three I will begin at the beginning and make a broom, so that you can then see the whole process."

To be sure we were glad to go, and he did as he said he would, and explained every particular, even to the cost.

"The broom-corn comes from the West," he said, "though a good deal grows in the Mohawk valley, and the largest broom establishment in the United States is at Schenectady.

"It often grows, if thriving stalks, ten or twelve feet tall; it can be cultivated here, but not so profitably. It comes in large bales, weighing anywhere from one hundred and fifty to five hundred pounds. Where I buy mine in Boston it costs me six cents a pound, though the price varies.

"I sort it out on a 'sorting bench,' first, for if I took it as it is, the brooms would be of queer qualities. Sorting is a regular trade to learn.

"The next thing, I tie it in bundles, and then it is ready for use. I put as many of these to soak the night before, as I want to make up in the day. I leave it in the water half an hour, then let it drain, and it keeps damp enough for working; if it was dry it would break when I sew it. Here you see this lot, from which I shall make the broom. I call

it 'stock' and when it is all prepared, I keep it on here; this is a 'stock bench' or 'rack,'" pointing to the wooden frame which filled the space between the two windows.

"You see I have three machines besides my cutter — the stock-frame, the winding-machine and the press. They were made at Schenectady, and they cost seventy-five dollars. You see one needs capital even to make brooms, but some friends helped me to get started. My cutter I will tell you about by-and-by as I come to use it.

"Now I am ready for the handle. These come a hundred in a bundle, and are made of the best spruce — these are from Maine — and each has a hole where the broom is put on. Now this is what I do first."

Here he secured the handle into a vise belonging to the winding-machine which was just high enough for him to stand at and work comfortably without stooping, and had also connected with it the "rag-wheel" from which the wire was unwound by a few rotations of a wheel below, while at the same time it was wound taut around the broom.

"They formerly used twine," he said, "but there were objections to it, as you will readily see, and

THE COMEDY OF BROOMS — MAMMA'S LITTLE HOUSEMAID.

now we have wire, and it is galvanized to prevent it from rusting. It costs me twelve cents a pound; it used to cost seventeen."

Having made the handle fast, he took a bunch of the corn, smoothed it carefully through his hands to even it, laid it against the handle, put his foot on the treadle or whatever the hour-glass shaped piece of mechanism might be named, and with one or two revolutions wired it tight. This lot had the butts left on, but from the next layer he sliced them down wedge-fashion with a very sharp knife, having secured them to those already on by a strap which could be fastened at such length as he chose by means of a leather button; another and another tier, each time of choicer quality, succeeded, and so on till the stock for that broom was used up.

"This," he explained, "is a number eight broom. If there had been time I would have made a *hurl* broom, which is the best. (The 'hurl' is the finest part of the corn, the heart.) I make five sizes: number six is the smallest, and it is the smallest manufactured in this country. I can make twenty of those in a day. Of the number ten, the hurl, I have made twelve, and they sell for forty cents apiece. Sometimes when I have got a lot of brooms

on hand I hire a horse and cart, take a boy with me, and go round the country to sell them; and people will object to paying my prices, and I can't always make them believe that it pays to buy a good article, even if it is a broom. They sometimes say that they can get enough of them at fourteen cents, but I tell them when they pay fourteen cents for a broom, they only get a fourteen-cent broom."

He had now a rough broom, which he released from the vise and took over to the press which had three pairs of cruel-looking irons that he said were "the jaws," of sizes to shut round brooms of three different thicknesses and hold firmly, while he did the next thing, which he made known in this wise:

"Now I shall sew it. The number six have only two sewings — all they need, they are so thin. The others have three. They are all sewed with waxed linen twine: the higher sizes have pink, because it looks better; the others have tow-colored. You see my needle? It is some like a sail-maker's, but not exactly. I have two, though one will last a life-time. I keep them in this oiled rag to prevent them from rusting. They cost fifty cents apiece, and were made of the very best of steel. See what nice metal it is!" He held out one, shaped more like a paddle

UP IN THE ATTIC.

than anything else, polished to the last degree, and as lustrous as silver; then he threw it on the floor to show us how it would ring.

"Broom tools of all kinds are made at Schenectady, but my needles, knives and combs come from Hadley. I will show you the combs pretty soon; the knives you have already seen. Let me see — where did I lay that other needle? No, you need not look for it; I must find it myself. I have to be careful where I leave my things, so that I can put my hand on them the moment I want them. Oh, here it is," picking it up with his long supple fingers, and rolling it securely up in the oiled cloth.

"Now you notice I put on this *palm*," and he held up what looked like a mitt just large enough to cover the palm of the hand and the wrist, having a hole to slip the thumb through and leaving that and the fingers free. It was made of cowhide, and sewed together on the back, while in the inside was set a thimble against which the needle was to be pressed in doing the hard sewing, while the leather protected the skin from being fretted by the broom.

"It is not just like a sail-maker's palm," he added. "I have one of those which a man gave me, and I

will show it to you." So going again to his dark closet, he groped for it among his multifarious things, and came back with one similar, except that it was of raw-hide, and the thimble was a little projection looking like a pig's toe.

He sewed the broom through and through, producing the three pink rows. Then he said he would comb it to clear away the loose and broken stems; and so he passed through it a sort of hetchel made of thirty small knife-blades set in a frame, "which cost me," said he, "more than you would think — that comb was five dollars; and now I comb it out with this one to remove the small stuff and the seeds." And releasing it from the clamp, he took down a fine comb from a nail, and repeated the process.

"And now it is ready to be trimmed. I lay it on this hay-cutter, which some friends bought cheap for me at a fair, and answered my purpose after a few alterations, and I trim it off, nice and even at one end — and now it is done. You have seen a broom made."

That was true. Our only regret was that we could not have that same broom to take away; but on our zig-zag journey, when we were likely enough to stop

"PLANT THE BROOM!"

over or turn off anywhere, that was an absurdity not to be thought of. We did, however, "buy a broom" that we *could* take — and an excellent one it proved — and we accepted a small package of broom-corn seed which the blind workman was anxious we should have, "to plant in some spare spot just to see how it looks when growing."

When we went down-stairs, the woman was out on the platform, her yellow hair tossing about in the wind, and she seemed as happy with her meagre accommodations in the freight house as if she were owner of a mansion. She begged us to go in and get some of her apples, we were welcome, and "they did not cost me anything," she added. She told us more about her fellow-tenant, and said he paid half the rent, "and he used to board with us, but now he boards up in town, and he goes back and forth alone, his self."

This curious and pleasant little episode made us so ready to be interested in everything pertaining to brooms that it seemed a kind of sarcasm of circumstances when, at a junction not very far along our route, we saw, perched upon his cart, a pedler doing his best to sell his brooms to the crowd on

their way home from one of the Cape camp-meetings. His words were just audible as the train went on:

"Buy a broom! Buy a broom! Here's the place to buy a cheap broom, for *fourteen* cents! *only* fourteen cents! A broom for fourteen cents! So CHEAP!"

And it happened not many days later that somebody read in our hearing that the broom-corn is a native of India, and that Dr. Franklin was the means of introducing it into this country; from seeing a whisk of it in the hands of a lady he began to examine it — being of an inquiring mind, as everybody knows — and found a seed, which he planted.

The street-sweeper's broom is the genuine *besom*, made of birch stems, cut out in the country, and brought into town tied up in bundles like fagots; suitable enough for those stalwart men who drag them along so leisurely, but burdensome for the hands of the wretched little waifs, who, tattered and unkempt, make a pretence of keeping the crossings clean; who first sweep, and then hold out a small palm for the penny, dodging the horses' hoofs, and just escaping by a hair's breadth the wheels of truck or omnibus in their attempts to secure the coin, if some pitiful passer-by stops at the piping call:

"Please ma'am, a penny!"

That is the almost tragic prose of brooms.

THE TRAGEDY OF BROOMS — THE CROSSING SWEEPER.

But there is a bit of poetic history that ought not

to be forgotten, for it was a sprig of the lovely broom bush — call it by the daintier name of heath if you will — such as in some of its varieties grows wild in nearly every country in Europe, a tough little flowering evergreen, symbol of humility, which was once embroidered on the robes, worn in the helmet, and sculptured on the effigies of a royal house of England. Which of the stories of its origin is true, perhaps no one at this distant day can determine; but whether a penitent pilgrim of the family was scourged by twigs of it — the *plantagenesta* — or a gallant hunter plucked a spray of it and put in his helmet, it is certain that the humble plant gave the stately name of "Plantagenet" to twelve sovereigns of that kingdom; and their battle-cry — which meant to them conquest and dominion, but has a very practical sound to us, and a specially prosaic meaning to one like the blind broom-maker of this simple story — was this:

"*Plant the broom! Plant the broom!*"

JENNIE FINDS OUT HOW DISHES ARE MADE.

AH! I know something! I know something you girls don't know! I know how they make dishes what you eat off of; and it's just the same way they make dolly's dishes, I guess.

Yes, I *do* know. And I've got some pictures papa *drawed* for me, too, and I'll tell you all about them. They're in my pocket right under my handkerchief. I put them under my handkerchief because I don't want them to get dirty. I've got some 'lasses candy on top. I haven't got enough, or I'd give you all some.

Papa took me to a *pottery*. I don't know why they call it a pottery, for they make cups and saucers, and sugar-bowls, and everything. First the man took us through the *dressing-room*. I did not see any dresses, nor anybody dressing themselves. I only saw piles

of dishes and men and women hammering at them. I asked papa why they called it that, and he said, wait till we come back, for that was the very last of all. So we went on into the yard. I looked into one part of the building where it was all dark, with three great chimneys, broad on the ground and narrow high up. But the man and papa went right on, round to the other side of the building.

There wasn't anything to see, though, but horses and carts hauling clay, and great heaps of it on the ground. I wouldn't have called it anything but dirt, but papa said it was *kaolin*, not exactly dirt, but clay. He spelt it for me.

There was another of those big chimneys in the yard, only bigger. The man said that was where they dried the clay. Then he led us to a little door in the side of the house, and we went in. That brought us into a little room where they were getting the clay ready.

First there was a sand-screen — like Mike uses, where they sieved it. Next they weighed it and put it into bins. It looked like fine, dark flour.

THE POTTER'S WHEEL.

A little piece off from the bins there was a big deep box. They were mixing clay and water in it, and making a paste. It looked like lime when they're making mortar. The box leaked awfully, and white paste was running down on the floor.

At the end of the box they had a pump working, and it was pumping the paste into what they called a *press*. It was too funny for anything. I couldn't more than half understand it. But it looks something like a baby-crib, only it has slats across the top, and they're close together. They have a lot of bags in be-tween the slats, and the clay gets into the bags and gets pressed flat, so that most of the water is squeezed out. When they take it out of the bags it looks something like a sheet of shortcake before it's cut or baked. Then they roll a lot of them together, and that's what they make dishes out of. They call it *biscuit*.

The man took us down into the cellar under the little room to show us the engine that made the paste and pumped and pressed the clay. I was afraid, and didn't want to go down, but papa said it was only a little one. It was nice and clean down there, with a neat brick floor, but awful hot. I was glad to come up.

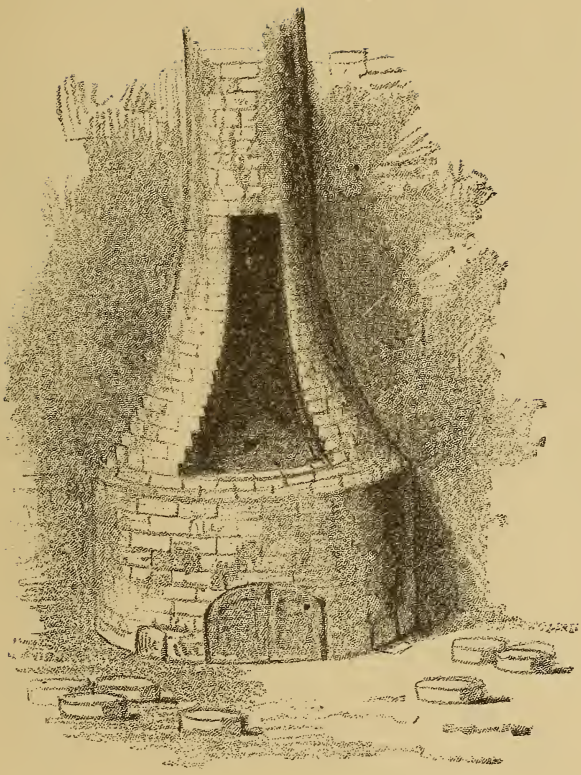
After the little room there's one big room where

they don't do much of anything. It is like a large shed, for it is dark and has no floor. The dressing-room where we were first is on one side, and the dark room where the big chimneys are, is back of it. We went through it, and over to one side and up the stairs to the second story.

It's nice up there. It's one great big room, five times as big as our Sunday School room, with ever so many windows. All around the sides and down the middle, and cross-ways, and out in the wings are shelves, piled full of brand-new dishes. And there are tables all along the walls, and that's where they make them. I conld stand and look all day.

I saw two boys throwing up a great big lump of clay and catching it; then cutting it with a string and putting the pieces together again, then throwing it up again, until it made me dizzy to look at them. I asked the man what they were doing, and he said, *wedging the clay*. That means taking the air out. They keep on doing that until there are no air-bubbles in it.

We stopped and talked to a man who was making a sugar-bowl, and he told us how he did it. All the men have on the table in front of them a lump of clay, a wheel, some moulds, a sharp knife, a bucket of water with a sponge in it, and something like the



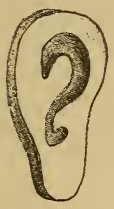
THE KILN AND SAGGERS.

slab of a round, marble-topped table, only it's made of plaster Paris, to work on.

And do you know what the potter's-wheel is? It's as old as the hills and it's in the Bible, but I guess everybody don't know what it is. It looks as if it was made of hard, smooth, baked white clay, and is something like a grindstone, only not half as thick. The grindstone stands up, but this lays flat, with its round side turned up, like the head of a barrel. And it's set on a pivot, like the needle of the compass in our geographies.

MOULD FOR A CUP.

The moulds are like Miss Fanny's wax-fruit moulds. They're made of plaster Paris, and they're round outside, and they have the shape of what the man wants to make on the inside, and they're in two pieces. Little things like cups are made in one mould; but big things like pitchers are made in two or three pieces, in two or three moulds, and then put together. Handles and spouts and such things are made separately in little moulds and put on afterwards.



HANDLE MOULD.

Here's the way. First the man cuts off

a piece of the biscuit, and kneads it on the plaster Paris slab. Then he takes one piece of the mould, fixes the clay in nicely, shaves off what he don't want, then puts on the other piece of the mould, and sets it on the wheel. He gives it a shove and sets it spinning. It stops itself after a while, then he opens the mould, and there is the dish. The clay keeps the same thickness all through, and fills both pieces of the mould.

Then the man takes it out and sponges it. If it isn't just the right shape all he has to do is wet it, and it will come right. Then he puts on the handle or puts the pieces together, fixing them just so with his fingers and knife. It isn't very hard, but he has to be careful. The soft dishes look real cute. Then they're ready to be burnt the first time.

We walked all around and saw here one man making cups, another, tureens, another, bird-baths, and every imaginable thing that is ever made in porcelain. Then we went down-stairs, through the dark rooms, into where the tall chimneys are. Then I found out they called them *kilns*. They have at the bottom a prodigious furnace, over that a tremendous oven, where they put the dishes in to bake.

But they don't put them right in just as they are. Oh, no. There were on the high shelves all around, a

MAKING A SUGAR-BOWL.

lot of things called *saggers*. They look something like bandboxes made of firebrick. The soft dishes are put in them, the lids are put on, and then they are piled up in the oven. Then the men build a big fire in the furnace, and let it burn for several days. When it goes out they let several more days go by for the kiln to cool, and then take out the saggers. When the dishes are taken out they are hard and rough and of a yellowish white. They build the fire after they get them in, and let it out and the kiln cool off before they take them out, because the men have to go in and out the big ovens.

Wouldn't you think a pile of soft plates and saucers would burn all together and stick fast to each other? Well, they don't. There are little things made of hard clay with three bars and three feet, and they put them in between dishes so that one plate has one in it, and the next plate sets on top of that, so that they can't stick together. Did you ever see three little dark spots on the bottom of a saucer? This is what makes them. There are lots and lots of these little stands lying all around everywhere, and broken pieces of them and the clay, scattered like flour all over the ground and floors thick.

We next went into the room back of the kilns. It had shelves all around, too, and there were piles of

dishes after the first burning. A lot of women sat on stools on the floor and they were brushing the fire cracks with some stuff out of little bottles. This was to fill them up so that the glazing wouldn't run in.

REST FOR FLAT DISHES.

We went into another room at one side of the first and there's where they did the glazing. They called it *dipping*. There was a large tank in the middle of the room with a deep red liquid in it. Papa asked the man what it was, and he said it was a secret preparation. The men dipped the dishes in, and they came out a beautiful pink, so pretty that it seemed a pity they couldn't stay so. There were shelves all around this room, too, and there the dishes look like they do when we see them — the pink glazing has turned white.

There is nothing more done to them except the *dressing*. We had now gone all around, and were almost at the *dressing-room* where we started. And when we went in again we found that the dressing was nothing but knocking off any rough lumps with a chisel. I remember every bit of it. And every time I look at dishes I think there are ever so many things we use every day and don't know anything about.

DOLLY'S SHOES.

I CAN'T help wondering if any of the little maidens who are having so much comfort with their beloved dolls in these Christmas holidays, ever think that *somebody* must have taken a great deal of pains to dress them up so nicely, and above all, to make the tiny garments and hats and shoes.

The doll's *shoes*! — so pretty, so daintily shaped, so beautifully stitched and trimmed, so perfectly, faultlessly finished from heel to toe, the "cunningest things" in all dolly's wardrobe — did it ever occur to the girlie "playing mother," to ask where they came from, and by whose dexterous fingers they were fashioned? She knows well enough that when Angelina Christina, or Luella Rosa Matilda Jennette, has worn

these out, there are enough to be bought in the toy shops for twenty-five or thirty cents a pair; *but who makes them?*

That was the question which came into *my* head one day, and I set to work to find out — doing just what must suggest itself to anybody who wants information, whatever the subject: that is to say, I went to head-quarters, and asked questions.

There are two places in Boston — one a "shoe and leather exchange," and the other the establishment of an importer and dealer in shoe store supplies, where they furnish doll's shoes "to the trade," as the phrase is: one is on Congress street, and the other on Hanover; and the proprietors, Mr. Daniels and Mr. Swanberg, instead of being amused at my errand, very kindly told me what I wanted to know.

Some of the shoes are imported, but they are inferior in style to those made in this country — notwithstanding they come from Paris, and everything from that place is supposed superlatively choice and to be desired, as you are very well aware. In the United States there is one factory — and but one, so far as I could ascertain — which supplies a large quantity, about fifteen hundred dozens, for the American market, sending them to all parts, and furnishing

the toy-stores in Chicago and other western cities, as well as New York, Philadelphia and Boston.

This manufactory is at Bordentown, New Jersey, and has been in existence about twelve years, and the value of stock now sent out is about seven thousand dollars a year; so much money for the wee feet that run on no errands, and save no steps for anybody! The wholesale jobbers of course advance the price, and in the retail stores they are higher yet; so that each tradesman through whose hands they pass has his trifle of profit in helping to shoe the feet of the doll-people. They retail from a dollar and a dollar and a quarter a dozen, to three dollars and seventy-five cents, according to the style.

They "run," as the dealers express it, in twelve sizes; the "common doll's shoes" (which means shoes for common dolls) vary, however, from the class made for wax dolls, which have grades peculiar to themselves, being not only extra full and wider in the soles, but numbering fewer sizes, from one to six only. Of the common kind, the slippers and ties run from one to twelve, the others from three, four or five to that number. They come packed in regular sizes, a "full line," as those for children do, or in assorted sizes and styles; in small, square boxes, such as shoe dealers know by the name of "cartoon," which is

another word for the French *carton*, meaning simply that they are made of paste-board. The tiniest is not much more than an inch long, but is a perfectly formed and finished shoe on that minature scale; and the largest is almost big enough for Mrs. Tom Thumb, measuring about four inches, and it could certainly be worn by many a baby you have seen.

As for the names, they come in this order: — slippers, ties, ankle ties, Balmorals, buttoned boots, Polish buttoned, Polish eyeletted, and Antoinette, which is a heeled, croquet slipper, in which her doll-ship, when engaged in that out-of-door game, can show off her delicate, clocked stockings to advantage.

But what shall I say of the variety in color and trimmings? They are in white and crimson, in buff and blue, in scarlet and purple, in rose color and violet, in bronze and silver and gold, everything but black, for dolls don't like black except in the tips of their gay Balmoral or Polish boots. And the stuff they are made of is such soft material as can only be found in goat and sheep and kid and glove kid, and *skivers*, which is the name for split leather. I strongly suspected that they were all made of scraps left from large slippers and shoes, but, though this is generally the case, some whole skins have to be used because nothing is ever manufactured for real people

in some of the fancy colors worn in the doll-world The soles are of leather of a very thin kind, but the heels are of what is called "composition" — a preparation of glue and melted rubber, or possibly, in some styles, of wax and clay made firm and hard, and they are stuck on with glue, just as the soles are fastened to the "uppers." The rest of the work is fine stitching done by hand ; and the little things are all shaped on lasts, and in every way made by precisely the same process as any shoes, (except the glued-on heels and soles,) being cut out by patterns, in "quarters" and all, and the seams, straps, eyelets, lacings and rosettes done just as for real people.

I opened all the boxes, and paraded some of the prettiest of each kind in a row before me, and sat and admired them. And I could not help wishing that I had also a row of little girls, to look and admire too. How their eyes would have shone, and what raptures, what exclamations, what shrieks of delight there would have been! "Oh! how cunning! what lovely rosettes! what elegant bows! what dear, little heels! oh! isn't this such a darling pair? They are too sweet for anything! I can't tell which to choose — they are all so be-*u*-tiful!"

That is what they would have said, and a great deal more besides. And they would have just wished

they could have this pair for Fanny, and that for Claribel, and that for Lady Geraldine, and so on and on; while *I* should have wished that I could make them all happy by giving them their choice.

But who could choose? The gold and silver ones were richest, quite dazzling to behold, and they had gilded and silvered heels, and they were shaped like a Newport tie; each had its minutely scalloped edge where the seams overlapped and round the ankle, and a bow of narrow, white, corded ribbon with an ornament of jet and gold, or jet and silver, in the centre, and they were fit for the feet of fairy queens. The sock-shaped ties, like a baby's soft-soled shoe, looked somehow most real of all, as if for the least mite of a human baby to wear on its wee, pink feet, and double up in its wee, pink fist. There were the ankle-ties, with the diminutive strap all scalloped and stitched, and set with minute eyelets through which a a purple or blue or scarlet braid was passed, and every part as fine as hands could make. There were low, laced shoes, with heels, and without; there were high-cut Balmorals with a long double row of eyelets, and extra high Polish boots, heeled and laced, or heeled and buttoned; and they were in white with scarlet tips, in white with gilt buttons, in bronze with steel.

It is hard to tell what there was *not*, for there were

boots and shoes and slippers for all kinds of dolls, high and low, rich and poor; to walk in, to dance in, to play croquet in, or to stay at home in; to match their costumes, to match their hair, to match their eyes, to suit them if anything on earth *could* suit. And every doll could be sure about her "size," for the number is stamped on the bottom of the soles; and I must not forget to say that they have also the "trade-mark," which is the imprint under the number; this "trade mark" is a pair of boots smaller than anything you can think of.

Now I am coming to the original question — "*who makes them?*" They are made in large quantities during about six months of the year, accumulating in the summer, ready for the trade, which begins in August, and drops off after the first of January, and is over with for that season by March. In those six working months the factory employs about forty women, and they are mostly invalids or old persons who are not able to do anything but light work, and who receive only small wages, because they are not capable of earning much. So they are generally thin, pale hands and slender fingers which patiently and skillfully fit the patterns, and sew the seams, and do the even nice stitching, and dainty ornamentation,

which help to make glad the hearts of the many little girls all over the country, who have found a precious doll, all so daintily shod, among the gifts of their Merry Christmas.

MY DOLLY! MY OWN LITTLE DAUGHTER!

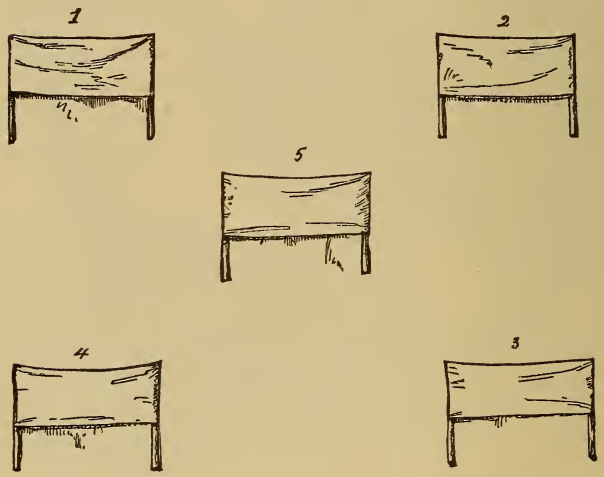
TALKING BY SIGNALS.

WHEN boys live some distance apart, it is pleasant to be able to communicate with each other by means of signals. Many and ingenious have been the methods devised by enthusiastic boys for this purpose. But it can be brought much nearer perfection than has yet been done, by means of a very simple system.

At the age of fourteen I had an intimate friend who lived more than a mile away, but whose home was in plain sight from mine. As we could not always be together when we wished, we invented a system of signalling requiring a number of different colored flags; but we were not quite satisfied with it, for we could send but few communications by its use. Then, when we came to test it, we found the distance was too great to allow of the different colors

being distinguished. The white one was plainly visible. It seemed necessary, therefore, that only white flags should be used. We studied over the problem long and hard, with the following result.

We each made five flags by tacking a small stick, eighteen inches long, to both ends of a strip of white cloth,* two feet long by ten inches wide. Then we nailed loops of leather to the side of our fathers' barns, so that, when the sticks were inserted in them, the flags would be in the following positions:



The upper left hand position was numbered 1,

* If the buildings should be painted, the flags should be of a color that would contrast with that of the paint.

upper right 2, lower right 3, lower left 4, centre 5. Notice, there was no difference in the *flags;* the *positions* they occupied determined the communication.

Thirty combinations of these positions can be made:

1 — 1 2 — 2 4 — 1 2 3 — 1 4 5 — 1 2 3 5

2 — 1 3 — 2 5 — 1 2 4 — 2 3 5 — 1 2 4 5

3 — 1 4 — 3 4 — 1 2 5 — 2 4 5 — 1 3 4 5

4 — 1 5 — 3 5 — 1 3 4 — 3 4 5 — 2 3 4 5

5 — 2 3 — 4 5 — 1 3 5 — 1 2 3 4 — 1 2 3 4 5.

These combinations were written down ; and opposite each was written the question or answer for which it stood. The answers likely to be used most we placed opposite the shortest combinations, to save time in signalling. My old "Code" lies before me, from which I copy the following examples:

1. *Yes.*
2. *No.*
3. *Morning.*
4. *Afternoon.*
5. *Evening.*

1 2. *Can you come over?*

1 3. *When?*

2 5. *Wait till I find out.*

1 3 4. *Can you go a-fishing?*

2 4 5. *Are you well to-day?*

Suppose, now, that I place flags in positions **2 4** and **5**. (See the above examples.)

Harry glances down his "code" until he reaches 2 4 5 and its signification, and perhaps answers with a flag at 1.

Then the following dialogue ensues:

I. 1 2.

He. 1 5.

I. 4.

He. 2 5.

And, in a few moments,

He. 1.

We usually spent our noon hour conversing with each other in this manner; and, when it became necessary for either to leave his station, all the flags, 1 2 3 4 5, were put out, signifying "gone."

One combination, 1 2 3 4, was, by mutual consent, reserved for a communication of vital importance, "COME OVER!" It was never to be used except in time of trouble, when the case would warrant leaving everything to obey the call. We had little expectation of its ever being used. It was simply a whim; although, like many other things, it served a serious purpose in the end.

Not far from my father's house stood a valuable timber lot, in which he took an especial pride. Adjoining this was an old apple-orchard, where the limbs of several trees that had been cut down, and the prunings of the remainder, had been heaped

together in two large piles to be burned at a favorable opportunity. One afternoon, when there was not the slightest breath of wind, we armed ourselves father and I, with green pine boughs and set the brush-heaps a-fire. We had made the heap in as moist a spot as possible, that there might be less danger of the fire spreading through the grass. While the flame was getting under way, I busied myself in gathering stray bits of limbs and twigs — some of them from the edge of the woods — and throwing them on the fire.

"Be careful not to put on any hemlock branches!" shouted my father from his heap. "The sparks may snap out into the grass!"

Almost as he spoke a live coal popped out with a loud snap and fell at my feet, and little tongues of flame began to spread through the dead grass. A few blows from my pine bough had smothered them, when snap! snap! snap! went three more in different directions. As I rushed to the nearest I remembered throwing on several dead hemlock branches, entirely forgetting their snapping propensity.

Bestowing a few hasty strokes upon the first spot of spreading flame, I hastened to the next and was vigorously beating that, when, glancing behind me, I saw to my dismay that the first was blazing again.

Ahead of me was another, rapidly increasing; while the roaring, towering flame at the heap was sputtering ominously, as if preparing to send out a shower of sparks. And, to make matters worse, I felt a puff of wind on my face. Terror-stricken I shouted:

"Father! The fire is running! Come quick!"

In a moment he was beside me, and for a short time we fought the flame desperately.

"It'll reach the woods in spite of us!" he gasped, as we came together after a short struggle. "There isn't a neighbor within half a mile, and before you could get help it would be too late! Besides, one alone couldn't do anything against it!"

A sudden inspiration seized me.

"I'm going to signal to Harry!" I cried. "If he sees it he'll come and, perhaps, bring help with him!"

"Hurry!" he shouted back, and I started for the barn. The distance was short. As I reached it I glanced over to Harry's. There were some white spots on his barn. He was signalling and, of course, could see my signal.

Excitedly I placed the flags in 1 2 3 4, and, without waiting for an answer, tore back across the fields to the fire. It was gaining rapidly. In a large circle, a dozen rods across, it advanced toward the

buildings on one hand and swept toward the woods on the other. We could not conquer it. We could

IN OBEDIENCE TO THE SIGNALS.

only hope to hinder its progress until help should arrive.

Fifteen minutes of desperate struggle and then, with a ringing cheer, Harry and his father dashed

upon the scene. Their arrival infused me with new courage; and four pairs of hands and four willing hearts at length conquered the flame, two rods from the woods!

My father sank down upon a rock, and, as he wiped the perspiration from his smutty face, he said:

"There, boys, your signalling has saved the prettiest timber lot in the town of Hardwick! I shall not forget it!"

Were we not justly proud?

Two days after I found upon my plate at breakfast a small package, which contained two pretty little spy-glasses.

"Perhaps they will enable you to enlarge your 'signal code,'" was all my father said when I thanked him.

We soon found that with the aid of the glasses we could distinguish any color. So we made a set of blue flags, which gave us thirty more communications by using them in place of the white ones. And, by mixing the blue flags with the white combinations and the white with the blue combinations, over *two hundred* communications could be signalled. Thus we could converse with each other by the hour.

The way we wrote down the mixed combinations was, by using a heavy figure to represent a blue flag;

as 1245, which meant that positions 1 and 4 were occupied by white flags, 2 and 5 by blue ones.

Blue flags can be inserted in the original thirty combinations in the following manner: 12, 123, 123, 1234, 1234, 1234, 1234, 1234, 235, 235, 2345, 2345, 2345, 2345, 2345, 2345, 2345, and so on.

Among the many recollections that throng my memory in connection with this subject, is that of an incident which has caused me many a hearty laugh since its occurence, although at the time I did not feel particularly amused. Harry had gone away visiting, giving me no definite idea of when he would return. So, one drizzling, uncomfortable day, as I was sitting rather disconsolate at my barn window, I was delighted to see several flags appear on his barn.

Eagerly I read:

1 3 4. "*Can you go a-fishing?*"

The fine drizzling rain was changing into larger drops, and there was every reasonable prospect of a very wet day, and I thought he must be joking; but I answered:

"*When?*"

"*Now*," was the reply.

"*Where?*" I asked.

"*Bixbee's pond.*"

"*Are you in earnest?*"

"*I will meet you there.*"

I answered "*Yes*," and, shouldering my fish-pole, started off across-lots. The distance was fully a mile and a half, and before I had passed over a quarter of the distance the bushes, dripping with rain, had completely drenched me. When nearly there the increasing rain became a heavy shower; but I kept on. I reached the pond, but nothing was to be seen of Harry. Not a frog could I find for bait, owing to the incessantly pouring rain, and I knew it would be difficult to find a worm. So, after half an hour of tedious waiting and monotonous soaking, I started for Harry's, my patience entirely worn out.

The rain came down in torrents as, at length, I turned in at the gate; and I suppose I looked as forlorn as a drenched rooster, for I heard a girlish giggle as I stepped upon the piazza, but I did not then suspect the truth.

"Where's Harry?" I asked of his mother whom I found alone.

"Why, you didn't expect to find him at home, did you? He won't be back for a number of days yet."

(Another subdued giggle from the next room.)

"You're as wet as a drowned rat!" went on the

motherly woman. "What on earth started you out in this rain?"

"It's that Hattie's work!" I burst out angrily, and told her the whole story.

"Dear me!" she exclaimed, holding up her hands, despairingly, "I never did see such a torment as that girl is! I noticed she has seemed very much tickled over something! I'll give her a real scolding!"

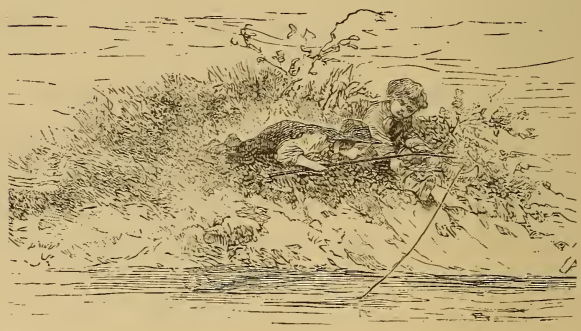
I darted out the door; and, as I splashed my way disconsolately down to the road, I heard a voice, struggling between repentance and a desire to laugh, call after me:

"Forgive me, Charlie, but it was *such* a joke!"

Hattie never meddled with her brother's signals again. For her mother's displeasure and the severe cold that followed my drenching more than balanced the enjoyment she derived from that very practical joke.

Two years ago I visited my native town. Resuming my old place by the barn window, I gazed across the intervening forest to where Harry used to stand and signal to me. Tacked up against the window-sill was my old "signal code," covered with dust and cobwebs. Harry was hundreds of miles away,

carving himself a name among his fellow-men. Of all the friends of former days, scarcely one remained in the old town. And I could only wish, with all my heart, that I were once again enjoying my boyhood's happy hours.



HOW LOGS GO TO MILL.

A MAINE WOOD-CHOPPER.

ALL BOYS and girls know that boards are made of sawed logs, and that logs are trunks of trees. Few, however, know

with what hardship and difficulty the trees are felled, trimmed and carried from the woods where they grow to the mills where they are made into boards.

In the far West, and in the wilds of Maine, are acres upon acres, and miles upon miles, of evergreen forests. One wooded tract in Maine is so vast that it takes an army of choppers twenty years to cut it over. By the time it is done a new growth has sprung up, and an intermediate one is large enough to cut; so the chopping goes on year after year. The first or primeval growth is pine. That is most valuable. After the pines are cut, spruce and hemlock spring up and grow.

Most of the men who live in the vicinity of the lake region work in the woods in the winter. They camp in tents and log huts near the tracts where they are felling trees. All day long, day after day, week after week, they chop down such trees as are large enough to cut, lop off the branches and haul the logs to the nearest water. This work is done in winter because the logs are more easily managed over snow and ice. All brooks large enough to carry them, all rivers, ponds and lakes, are pressed into service and made to convey the ponderous freight towards civilization. All along

the shores and in the woods are busy scenes — men, oxen and horses hard at work, the smoke from the logging camps curling among the trees.

Every log has the initial or mark of the owner chopped deep into the wood to identify it. Then, when the ice breaks up, the logs are sent down the brooks to the rivers and through the rivers to the lakes. The logging camps are disbanded, the loggers return to their homes, and the river-drivers alone are left to begin their duties.

The river-drivers are the men who travel with the logs from the beginning of their journey till they are surrendered to the saw-mills. Each wears shoes the soles of which are thickly studded with iron brads an inch long; and each carries a long pole called a "pick-pole," which has a strong sharp-pointed iron spike in the end. This they drive into the wood, and it supports and steadies them as they spring from log to log.

Their first duty is to collect "the drive." The logs which form "the drive" are packed together and held in place by a chain of guard-logs which stretches entirely around the drive, forming what is called "the

boom." The guard-logs are chained together at the ends about two feet apart. The guard is always much larger than the boom of logs, so that the shape of the boom may be changed for wide or narrow waters.

At the head of each boom is a raft which supports two large windlasses, each of which works an anchor. On this head-work about thirty river-drivers take up their position to direct the course of the boom.

To change its position or shape, ten of the drivers spring into a boat or bateau; one takes a paddle at the bow; eight take oars; and one, at the stern, holds the anchor. They row with quick strokes toward the spot where the anchor is to be dropped, the cable all the time unwinding from the windlass.

"Let go!" shouts the foreman.

Splash! goes the anchor overboard.

The boat then darts back to the head-works. Out spring the men to help turn the windlass to wind the cable in. They sing as they work, and the windlass creaks a monotonous accompaniment as "Meet me by moonlight," or the popular "Away over yonder," comes floating over the rippling water.

Meanwhile another bateau has been out with another

A RIVER-DRIVER.

anchor; and as both windlasses turn, the boom swings toward the anchorage, and thus is so much further on its way.

Though the men sing as they work, and make the best of their mishaps with jests and laughter, they often carry homesick hearts. In cold and stormy weather their hardships are great, an involuntary bath in the icy water being an event of frequent occurrence. Also their work demands a constant supply of strength which is very trying; frequently a head wind will drive them back from a position which it has taken several days to gain, and all the toil of fresh anchorages must be repeated.

The most dangerous part of the work is "sluicing" the logs. When the boom reaches the run which connects the lake or river with the dam through the sluice of which the logs must pass, the chain of guard-logs is detached, and fastened in lines along both sides of the run, and the rafts are drawn off to one side and anchored to trees. The river-drivers, armed with their pick-poles, are then stationed along the run, on the dam, wherever they may be needed.

The liberated logs now come sailing along, their

speed quickening as they near the sluice. When they reach it they dart through, their dull, rapid, continuous thud mingling with the roar of the water. How they shoot the sluice! log after log — two, six, a dozen together — pitching, tossing, struggling, leaping end over end; finally submitting to destiny and sailing serenely down the river toward another lake.

Meanwhile the river-drivers with their long poles and quick movements, looking not unlike a band of savages, have enough to do, with steady feet, and eyes on the alert. For of all the vast array of logs — and I once saw twenty-four thousand in one drive — not one goes through the sluice but is guided on to it by one or more of the drivers. They often ride standing on the floating logs, conducting this, pushing that, hurrying another, straightening, turning and guiding; and just before the log on which a driver stands reaches the sluice, he springs to another.

Woe to him if his foot should slip, or his leap fail! He would be crushed among the logs in the sluice, or dashed among the rocks in the seething water.

After all the logs are safely sluiced, the chains of the guards are slipped, the rafts are broken up, and

"THE LIBERATED LOGS CAME SAILING ALONG."

these, windlasses and all, follow the logs. Then the boats are put through the sluice. Sometimes, when

THROUGH THE SLUICE. — A DANGEROUS PRACTICE THIS.

the dam is high, some of the river-drivers go through in the boats — a dangerous practice, this; for often the bateaux have gone under water, entirely out of

sight, to come up below the falls, and more than once have lives been lost in this foolhardy feat.

A boom generally passes from three to six dams, and sometimes takes four months to reach the mills.

Occasionally the logs become jammed in the rivers, and must wait for more water; if this can be supplied from a lake above, the difficulty is easily remedied.

In the spring of 1880, a jam occurred at Mexico in Maine. The logs were piled forty feet above the water and covered an extent of area as large as an ordinary village. This great jam attracted visitors from all parts of the country until the spring freshets of the next year could supply the river with water sufficient to loose them and bear them on their way.

At the present time, July, 1880, the jam is still there. I saw the driving and sluicing as I have described it, in May, 1880. It was very interesting.—S. B. C. S.

A PEEP INTO A LACE KINGDOM.

THE lace handkerchiefs, so intricately wrought that they resemble a spider's web, which you see in Mudge's and other lace stores in Boston, generally come from Paris, where they are worked by little people much like yourselves, only ever so much more patient and industrious I fancy.

Never had my eye rested on a lovelier sight than the half-ruined convent of Sorrento built of malachite, with the sun shedding its flood of silvery light over its narrow windows of stained glass closely guarded with thick iron rails, with creeping vines, flowering into red and white, entwining themselves between each rail.

Its associations, those of recent history, were interesting. The Franco-Prussian war had destroyed much of its beauty. It towered one hundred and

fifty feet in the air, and the steeple itself, constructed of old Grecian malachite, had risen gracefully another hundred. The French troops took refuge within its walls from the flying cannon balls of the warriors, but the well-directed storm destroyed the steeple, and a portion of the southern-most extremity.

We passed up six or seven malachite steps, and opened a door of the same beautiful stone. We found ourselves in a narrow passage, narrow where we stood, but diverging into an open space from which, in all directions, led flights of malachite steps. These terminated at little malachite doors. Passing through one of these doors we found ourselves in the body of the building. Presently we heard soft chanting, then louder, until the sound ceased altogether.

"These are the workers, Monsieur," my guide informed me.

"But what workers? and do they sing over their work?" I asked.

"They are not working now. Yes, these are the little convent workers whose fingers make cobwel 'kerchiefs."

"Lace handkerchiefs?"

"Lace 'kerchiefs, embroidered linens, even to the trousseau."

"But where are they?"

"Come. This way."

Down the middle of the room we went; and the room being quite dark though it was day without, we had to grope our way along. We at last descended a long flight of steps till the hall below was reached. Turning abruptly to the left, we passed through another malachite door; and then the mysteries of Sorrento burst upon us.

There were, as near as I could determine, a hundred girls of all sizes and ages seated close together along the sides of the four walls, and their little fingers, dexterously plying the needle, kept time with their bobbing heads. All wore white caps, and their neat white pelisses were as snowy-white as their caps. Inside of this square, for it was almost a perfect square although very large, another set of girls sat in a circle working as assidiously as those which were along the walls. All had needles in their hands which looked somewhat like crochet needles, the points of each curved like a hook; and with two of these to each little girl, you can form no idea how beautiful a sight was presented by these hundred girls keeping time with each other, yet very quiet.

The twenty-five windows of countless colors along the sides and at each end of the huge building, were draped with their artistic work. There were lace shawls,

embroidered shawls, embroidered dresses from red to white and from white to palest green, worked openly or closely as the case might be ; fans of perfect symmetry, large and small, of all colors, woven with the delicate nicety of experienced masters ; hoods with vines and leaves running through them, some elaborately wrought, others plainer in design, but all of beautiful workmanship. These beautiful things, of which there were hundreds upon hundreds already completed and as many more under way, hung carelessly from the several high windows, drooping oftentimes on the smooth malachite stone of the floor.

Presently a lady dressed in spotless white from head to foot and wearing an immense nun's cap, such as our Sisters of Charity wear, came towards us and extended her hand in a friendly manner.

This was one of the Sisters. Her calm, sweet and benign countenance reflected the calm life she led ; and she looked upon the little women around her ever so proudly, saying :

" Are they not very industrious ? "

And I learned that these little women, some scarcely ten years of age, were each and every one orphans and waifs of Paris and the surrounding neighborhoods, who had been taken in by these kind sisters, and by them, instructed in the delicate art of embroidery.

Their lives could not be monotonous, for when they were not working, the Superior and Sisters taught them to sing, and instructed them in different studies, until they soon loved their instructors, and wished to lead no other life. Some of these little workers were handsome, others were very plain indeed; yet each and all bore a settled look of resignation, which you could not help but pity, although, when you heard them cheerily hum to themselves over their work, and saw the bright smile with which they looked up at a visitor, you would think after all, that they might have spent their lives in a worse place. Here was their home; the Superior and Sisters were their father and mother all in one.

We ascended to the room above. Instead of being dark as when we first entered it, it was now quite bright. Rows of tables clothed in spotless white on which plates were set, occupied most of the room. There were no chairs visible. This I found to be the dining hall. From a side door through which my guide took me, I found a flight of steps leading to still another room. This room was similar to the one below,— the tables stood there, beds with snowy linen stood here. My guide informed me that two of these girls generally occupied the same bed, sometimes three slept together without quarrelling. At one extremity of this

room a series of wash tubs in malachite occupied a niche proportioned off for the purpose; and it was there that these girls betook themselves in the morning, by turns, to wash.

When we reached the dining hall below, the girls headed by the Superior herself, were standing orderly around the several tables waiting to be helped to the plain but wholesome meal. All their faces looked glad, and I certainly never saw a prettier sight. They seemed of uniform height as I looked down the rows.

This convent, the Cordelia, makes almost exclusively Point d' Alençon lace, but when orders are received for patterns requiring a cheaper lace, the Sisters use a much coarser thread than that employed in the Point d' Alençon, and work it into those cheap laces such as Pillow, silk and cotton Blonde, and Buckinghamshire. The other convents in Paris make a greater variety of laces, such as Maltese-point, Portuguese-point, Rose-point and Guipure; the latter is, I believe, considered a very handsome lace, especially when worked into ladies' caps, and little plats for the head. The threads used are of silk, but it is impossible to get them to that fineness observed in the Point d' Alençon, which is the very best made, and is becoming so scarce that a very high price is demanded for it in Paris where it is made.

Venitian-point is not thought very much of in Paris, and although it of course had its origin in Venice as its name indicates, the convents of Paris have made it for many years; and people buying this lace in Venice are often compelled to pay an exhorbitant price, but if they bought it in Paris of any of the Sisters, or at the shops, the price would have been thought very reasonable.

What may be considered as the second-class, or rather that lace which we would call "common," is Chantilly, Mechlin, Saxony, Grounded-Spanish, Spanish and Pillow, or sometimes called Bobbin-lace, because of the pillow or cushion used to work the pattern upon. The remaining laces which are known, are Brussels, Valenciennes, Lisle and Limerick and Honiton, the last being the most beautiful made in Great Britian. Queen Victoria's wedding dress was of Honiton.

But this wonderful collection of laces would, I think, be quite incomplete were I to omit the very beautiful gold and silver lace, which I hope you know is very much like other kinds of lace only the threads employed in its manufacture are finely coated with either gold or silver. The threads used may be either of linen, silk or cotton, and may be either manufactured by hand or machinery; but I hope none

of you think that modern machinery can do what a pair of hands can, properly trained; probably, however, Luigi Mastini of Milan, who manufactures a great deal of this lace, thinks very differently, for his large works there, turn out annually lace to the value of £16,000 or $80,000.

The threads used in the laces above-mentioned are either of linen, silk or cotton, and all laces ever made were of these fabrics. You could no more tell how certain threads are employed in executing a pattern by looking ever so attentively at the little lace worker, than you could learn to swim by looking at an expert swimmer. But as nothing is ever learned except by constant practice, the little convent workers first *look on*, then *try*, *try*, *try* for themselves, but although their duty seems at first obligatory, they know that a home with the Sisters is better than a home —a very poor home— in the streets. As intricate pieces of lace, and sometimes those which are not intricate, are always executed by the aid of a pattern, as embroidery is done by some of the American girls, the first duty seems to be to have a very pretty pattern. Who really makes these patterns, no one ever told, but probably the Sisters or others of office connected with the convent, mark out the pattern in distinct outlines of ink. and then hand it to the

worker. These patterns are first covered from end to end and side to side, with thread, (which I say may be of silk, cotton or linen,) so as to make a complete web, very much like a firmly-spun spiders', and although this wonderful web is perfectly unintelligible to us, it is not so to the little worker, who, having spun this preliminary net work, takes some of the threads already laid, between her fingers and covers them by loops of cross-stitches; the small spots which are worked in between threads are called *modes* and are oftentimes put in after the entire work is completed.

Where there are so many workers of lace in these convents, a great many people imagine that the Sisters or managers have nothing better to do than to barter their wares to whomsoever may chance to come there; but this really ought to be explained before the impression gets to be general. The Sisters or convent managers, as they are called, are not allowed to dispose of their wares at the convent, although perhaps now and then a stranger seeing some little trifle which he fancies, is allowed to purchase it.

The convents are all governed by a Board of Managers hired by the city, and the Sisters really only fill the position of Superintendent. The manner, therefore, of transacting the business with the world outside

is quite simple, and not at all the way you at first suppose. You do not go to the Convent if you wish to purchase, but the Convent comes to you, so to speak, although, of course, it would be hard enough for one of these buildings to walk any distance. In other and plainer words, the Managers of the Convents establish a suitable number of agencies, for an exhibition and sale of their wares. So if you wish to purchase of Cordelia *Sœur* you look for a certain street, and having found this street, you look for a little sign — Cordelia *Sœur* (Sister Cordelia), and pull, very likely, a small-looking bell, and are marshalled into a small entry and then into a room, by a person whom you readily recognize as a sister. Then you look at any manner of wonderful things about you, and purchase if you are so inclined.

If a wholesale or retail dealer of laces in Paris wishes to order a certain lot of a certain kind of lace, he does not order through the Convent, but goes instead to some one of these agencies; and, if these do not have what is wanted, they immediately order from the Convent direct, the order-giving invariably coming through the agency or agencies first.

I do not know what manner of way the Sisters dispose of the funds received for the delicate work done under their Superior; but I suspect that a great

part of the money is devoted to charity, many a poor family, honest but unable to support themselves, have blessed the kind Sisters. Then again, I cannot help thinking that a good deal of this well-earned money goes to the support of some of those veteran lace-makers, or rather thread-makers, who always work in damp and darksome cellars, weaving thread from their spinning distaff of such fineness that they have to put blue paper under it in order to see it at all; who come and go so mysteriously, and are looked on with such awe, as they stagger along leaning heavily on their canes, from one part of Paris to the other. These women — so old, so repulsive looking — were once young like yourself, as bright and sparkling as any girl; and even now in spite of their infirm walk, they have a brighter, quicker, keener eye than any of you will ever have. They cannot only see a pin in the darkness, but they can pick up a hair when no light whatever shines upon it. These women are the most dexterous workers of lace, in all patterns, but they now in their old age content themselves in weaving the finest of fine thread and selling it at fabulous prices.

The reason that darkness, and the humid, subterraneous atmosphere of a cellar are preferable to light, and a good, dry, wholesome-smelling room, is because the

thread would instantly break if it came in contact with the dry air above; and the only way of conveying it to the upper regions is on reels nicely covered up. Belgium lace is made in this way, and I have heard that many of the workers have been shut up in these prison-like enclosures a greater part of their lives. But would any one of you like to work from one year's end to the other, in such a dark and loathsome place for a little thing they call — money?" No, not even upon lace.

A MAPLE SUGAR CAMP.

IS there not a fascination about that word "camp?" The very mention of it is enough to set one wild to be off somewhere. It suggests the freedom of all out-of-doors, which so many of us grown folks, and all children who have the real child nature, so often long for and delight in.

To go, as Charles Kingsley says, and "be a salvage" for a while! To go as the trappers and hunters go, only there should be no traps and no guns among our belongings! To do as the explorers and surveyors and naturalists do; sleep o'nights out under the sky, and live on food not cooked over civilized fires, or according to the routine in civilized homes under roofs in houses over kitchen stoves! Would not it be rapture now and then to try the way of Daniel Boone and of Frémont among the Rocky Mountains, of Wilson,

the ornithologist, and Audubon and his wife? Or the modern pastoral life of the young men who tend the cattle and sheep on the mountain pastures of Montana and the Texan plains? I cannot remember the time when I did not envy the boys who used to go off sugaring to a certain camp under the maples a mile and a half off on the hill. It was a privilege exclusively belonging to boys; and it always appeared as if boots had something to do with it — those stiff, tall, thick-soled boots of theirs which came about up to their knees, made to order by the shoemaker, out of calf-skin or cow-hide, and by him warranted water-tight, provided they were kept well greased, which matter was faithfully attended to by the wearers, who used semi-weekly to smear them with melted tallow and rub it in till the leather would shed water like a duck's back. What advantages in wearing such boots! Boys could go through the slush and slumping drifts; but the travelling was too bad for girls. Boys could go across lots and climb over walls, and wade. "Besides," it was no place for girls — they could eat maple

sugar at home. "Besides," it was too far. "Besides," they would get "all tanned up." "Besides," the boys were going to stay all night. That ended it. Now, as for staying all night, why that was the thing we greatly desired to do. Oh, just to sit in the fire-lit camp and see the shadows come and go, and the blaze waver and fail and then roll up in a great wave of brightness; and to know that we were off in the night; to forget everything we were used to, and live in the new strange world; and look off and see the phantoms of trees, and the cold, glistening, frosty mist down in the valley, and the solemn mountains standing back against the sky; to hear the voices of the night, not like summer ones, for katy-did and grasshopper and cricket were all gone to the Land of Light, if there is one for insects, or were swathed in their shrouds, or hidden away, or had returned to the dust from which they came; but there were birds, and pensive small voices would come out of the dark, a startled squirrel would rustle the dead leaves, and rabbits are known to walk abroad between midnight and cock-crowing; the river rumbled like

distant thunder away off somewhere where echo prolonged the sound; brooks under the crust tinkled and gurgled, and whiles, as the Scotch say, the ice would crack. Voices of the night, lonesome and mystic — the air was full of them to one who had ears to hear.

THE SAP-BUCKETS.

We imagined it all, like Annie Keary, who begun her stories with "Let us suppose," and how, before it was dark we would gather dry sticks and cones and the kind of fallen pine-boughs that will snap when you step on them — and then the people who owned the camp would let us tend the fire, and it would roar and send out sparks — and no doubt smoke some, right into our eyes, and drop white

IN THEIR FOREFATHERS' WAY.

ashes on us, and burn our faces and holes in our garments. Perhaps, too, they would let us have a kettle or an old dinner-pot of our own — unquestionably they could hunt one out from some of those dark corners overhead where there were boards laid across for a storage place; and we would have some partly boiled syrup put in, and it would come to candy — flavored a little bit with smoke and the burning on, and mixed a little with hemlock leaflets and the crumbling relics of scorched pine needles.

We should probably find out all about sugar-making, too, about maple-trees, and wood-craft; and we would make our host tell us stories, Indian stories just scary enough to thrill us and make us afraid to look behind us if a stick crackled outside, and about the early settlers, and then those neighborhood stories which the shrewd country people can tell so well, real character delineations full of genuine human nature about some odd geniuses such as Mrs. Stowe delights to "write up."

That struck us as a charming idea of sugar camp life. We ought to have been born back three or

four generations ago, when the sugar-makers did things in a way more primitive, as the Indians taught them; for it was from the Indians that our ancestors learned to tap the maple-trees in spring and boil the sap down. There were not such limitations to the knowledge of the red men as many persons think. It is doubtful if there was much concerning the qualities of trees and plants that they did not know. To be sure they had plenty of time, the forest all around them, and nothing else to do except fight.

Very soon after the Pilgrims landed, some of Massassoit's people entertained the white strangers with "sweet bread," made of Indian corn, perhaps first parched, and then ground — whether the sweetness was that of corn meal alone, or from some other source, we are left to conjecture. Lately we have been told by a popular author that the Indians used to cook "little doughnuts of meal by dropping them into maple syrup," which is a hint for modern cooks to work out to more esthetic results. The aborigines had no iron utensils, so they used earthen pots of a rude shape, which they set over

the fire, and boiled the sap out in the open air. For collecting it they had wooden troughs, fashioned from a log by being burnt out or gouged out with a hard shell. Other wooden vessels were hollowed in the same way; and they had, besides these, pails, or buckets, made from great sheets of birch bark.

It is to be hoped that the Indians who were friendly, taught the newcomers the secret of the maple-trees very soon; for in that olden time when broths and bean-porridge and messes concoted from pumpkins made so much of the fare, when there was no coffee used, and tea only as the rarest luxury, what a treat it must have been to have had maple syrup! A writer who knows, says that "the sap of all the New England maples and birches, and lindens, and hickories, and walnuts, is watery and sweet and contains crystallized sugar." It seems also that under modern improvements there can be sugar made from eight different kinds of common field corn; but they did not know that it could be extracted from even the one kind they raised in the clearings, and

THE SAP-YOKE.

they could not have spared the corn if they had known.

They made the most, however, of what they had. About ten years after the Pilgrims came, somebody composed what was called a "Forefather's Song;" wretched rhymes, telling of wretched fare, but supposed to show us how they lived:

Instead of pottage and puddings and custards and pies,
Our pumpkins and parsnips are common supplies;
We have pumpkins at morning and pumpkins at noon,
If it was not for pumpkins we should be undone.

If barley be wanting to make into malt,
We must be contented and think it no fault;
For we can make liquor to sweeten our lips
From pumpkins and parsnips and walnut-tree chips.

Then four lines are wanting, which I will trust and hope were about something more toothsome than parsnips and pumpkins, namely, maple syrup — for next these two lines come in:

Now, while some are going, let others be coming,
For while liquor's a-boiling, it must have a-scumming.

Which is what the syrup needs.

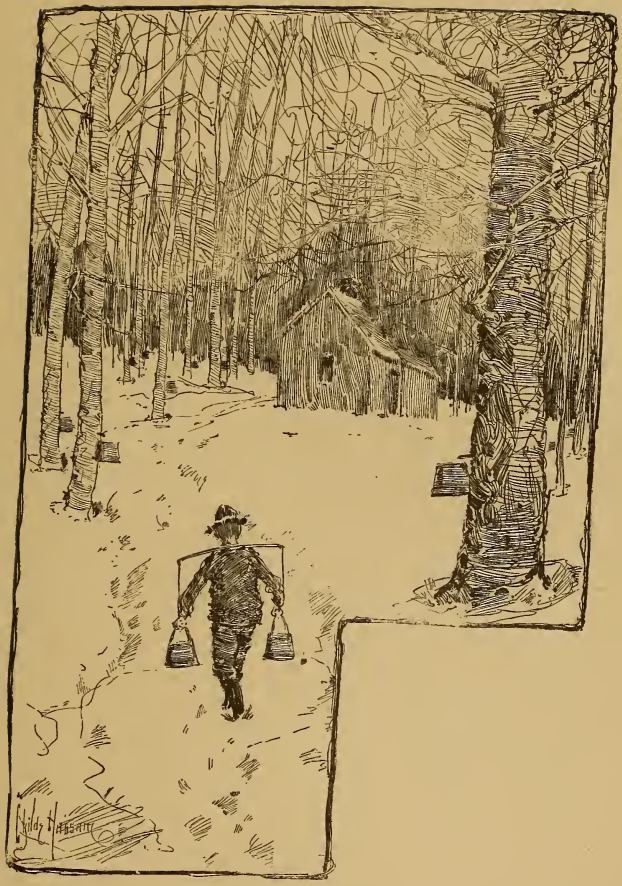
Poor rhymes; and poor forefathers and foremothers, if they had no better food!

The settlers tapped the trees in a way that was no better than murder to those magnificent sugar maples of the primeval forest. The process was called "boxing;" that is, cutting a deep gash to let the sap run out. A piece of sumach with a hole bored through the pith was the spout. The troughs to receive the sap were like a pig's trough. The trunk of a white ash was sawed into proper lengths, and then split in halves, and then dug out with a gouge or a chisel, driven in by hand beetles. An expert woodman, as an old historian says, could make thirty or forty of these in a day. Big troughs out of mammoth logs were hewn out for reservoirs into which to empty the contents of the small ones. The men and boys went around with pails attached to a sap-yoke over their shoulders, to collect the sap. If the snow was deep they wore "rackets," or snow-shoes, such as we see preserved as relics in museums, a sort of kite-shaped frame woven across with leather thongs or basket stuff.

The sap was boiled out-of-doors right in the "sugar bush" as they called it. Two crotched sticks were driven into the ground, perhaps eight

feet apart, and a strong pole known as the "lug-pole," was laid across them, a big side log placed against each stick on the inside, and between these the fire was built, usually of fallen limbs, and green ones which were gathered from the forest around. Great potash kettles were used, or smaller ones when those were not to be had; and when the sap was nearly thickened to syrup a piece of fat pork, or even tallow, was put in to keep it from boiling over. At the last it was strained through a flannel sieve and hung up in bags to drain. The women, and children who were old enough, helped, working with handkerchiefs tied over their heads; and altogether it was a wild and picturesque scene.

Sometimes the pleasant sugar-making season had a sudden tragic ending when Indians swooped down on the little frontier settlements, as happened once in the neighborhood of one called "Number 4." A certain good Deacon Adams started on a bright frosty April morning to make sugar on a hill a mile from the cluster of cabins. It was in the time of the old French War when



GOING TO THE SUGAR HOUSE.

French and Indians joined together against the English; and a party of them came down from Canada to this nook in the wilderness. The unsuspecting man, as he was trudging up the hill, was surrounded by seventy of them and tied to a tree while they went off and seized the next man they met, and the miller whose mills they burned; then with those captives and two hunters whom they took as they went along, set off for Canada. It was the hapless deacon's last sugaring, for though he was afterwards exchanged, he died on the way home.

There is a pathetic story in the old records of a child lost from the sugar bush who never came back and was never heard of after. The father had a "boiling place," at some distance from his cabin, and his little boys, one six years old and the other four, were fond of spending the day out there with him. Young as they were they could be trusted, for those children living in the wilderness were shrewd and sharp-witted, used to hardship and on the lookout for danger; and, one day when he was obliged to go to the cabin for

something, he felt safe in charging them to stay by the fire till he came back. But the elder one, happening to find a favorite spoon which had been lost there, was so overjoyed that he set out at once to follow his father, saying to the little one, "I will go up to the house and show the spoon to father," and from that moment was never seen again, though all the settlers for miles around turned out and searched the wilderness day and night, day and night as long as there was a possibility of finding him.

A hundred years ago there was a growth of grand rock maples in this part of New England, and some of the farmers at the foot of the mountain (Kearsarge) used to go up on snowshoes, with kettles and tools on their backs, and stay and tap the trees and make sugar. That was camp life indeed. There were bears and foxes in the woods and dens of the rocks, and the solitude was awful. Far up the lonely mountain side, with miles of wilderness between them and the little hamlets they had left, whose lights they could see twinkle and then go out

COLLECTING THE SAP.

as they sat under the roof of pine boughs and watched the kettles through the night; but the sugar-making came at a season too early for any other work, and in those hard times "boughten" sugar was dear and hard to get. There were trees there then that were three feet through.

The rock maple is the beautiful tree of the rugged New Hampshire hills, the natural growth of rocky soil, as much as the firs and tiny white birches upon the mountain tops, the pine on the sandy lands, the elms on the meadows, the willows by the water. It will live two hundred years; and it is such a wonderful thing for seeding itself that we should find ourselves surrounded by a wilderness in a few years if all the little maples were let live.

Somebody fond of gathering statistics says that in some of the little hill towns before trees were cut down so, many families used to make half a ton of sugar; Maine, New Hampshire, Vermont, Western Massachusetts, Ohio and Michigan, seem to be the favored regions, and there ought to be rock maples enough there to supply all their peo-

ple with sugar. There would be if all farmers did as well proportionately as some who manufactured in one season six thousand pounds of "stirred sugar" from seventeen hundred trees, and all this besides the molasses which drained from it.

Some makers refine it to the degree of loaf sugar till it is as white and crystal-like as a crust of snow. One man who described his way, said, as they all do, that the first thing was to have every and bucket spout and "carrier" and pan and kettle as sweet and clean as could be. They think it well to have covers to the sap-buckets, so that no leaves or anything shall fall in. They boil as soon as they can after the sap comes from the trees, keep the boiling sap well skimmed and clarify it with the whites of eggs or new milk stirred in; this makes a curd and all the impurities of the syrup rise with it. The whiteness is obtained by repeating the process of stirring and straining.

> It is stir, stir, and strain, strain,
> Let it settle, and do it again.

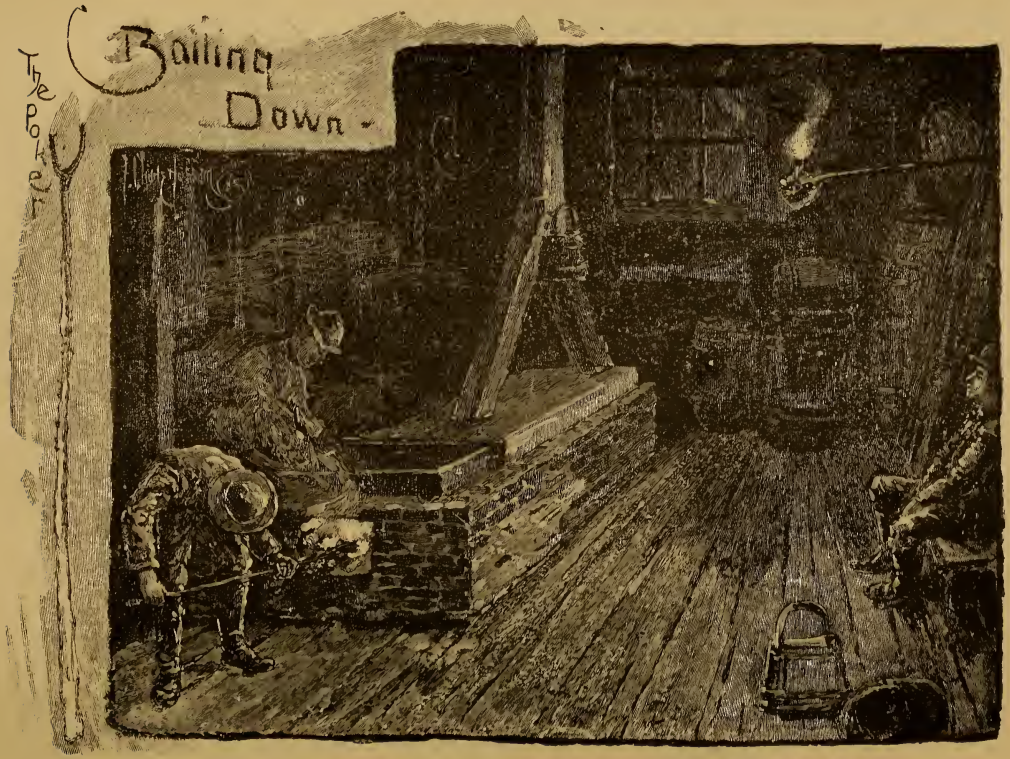
It was news to us that sap things never rust.

When the season is over, all the buckets are scalded with water, then rinsed with sap, dried, and put away in the sap-house; the same is done by the iron pans used for boiling; they receive a final washing with the sweet fluid and come out fresh and clean the following spring. The buckets are of pine, though people are beginning to use tin ones holding ten and eighteen quarts, and there is also a tin spout with a hook instead of the wooden one.

But that immaculate whiteness is of no special consequence unless one wishes to take a premium at a State Fair. We can all be satisfied with the "wax" — that delicious stage when we begin to try the hot liquid on a piece of snow crust, and keep tasting and trying, and trying and tasting till we pronounce it perfect; sweetness and flavor can no farther go; the aroma of the woods condensed in substance transparent as amber. When it is ready to "sugar off," one man says the test is to let fall a little from the point of a knife into cold water; if done, it will settle at the bottom "in a round flat drop."

Did you know that they sometimes feed bees with maple syrup before the flowers come? Think of it! Honey evolved from maple sugar by the mystic bee agency! What estheticism, what refinement, what luxury! And do not the bees and other insects sip at the sap bucket? The average boy does; and the old inhabitants make "sap coffee" and "sap beer." You have noticed how the shade trees all along a village street will suddenly, on a bright March morning, appear decorated with tin kettles at the end of pine spouts; and the tinkle, tinkle of little rivulets is heard as the generous trees yield their stored-up sweetness. It was not complimentary to the children of a certain place that last year all the trees had the spouts inserted and the pails and kettles hanging at a height which could only be reached by a ladder, and the ladder was not there.

Maple sugar time has no definite limits. Sometimes it begins in February, sometimes in March, or not till April when the "run" is a very short one. There is a mystery about the agencies which make the sap start. The wood-pecker who probes


Bailing Down -
The Poker

the bark may listen at the hole he has made and hear something about it; the woodchuck burrowed at the roots may be conscious when there is a stir within there; if there are dryads living in the trees and gnomes under them, they are sure to know. But the wisest woodsman cannot answer some of your questions. He will tell you that sap is sweeter from a tree which stands by itself; that it is thinner near surface water, and darker as you bore farther in; but why it is more abundant some years than others, and just how climatic changes affect the flow, or the time, or flavor, he cannot say.

The genuine sugar camp of old, without a roof over your head, the fire fed by sticks gathered up, a piece of fat pork hung above the kettle to keep it from boiling over, and all the gypsyish sort of life, has quite gone by, or pretty nearly.

You will find many a sugar place such as we did on that misty twilight of last April, when the travelling was neither wheeling nor sleighing; and the horses worrying through drifts that came to the wheel-hubs and then plunging into soft mud — that is the kind in sugar-time — took us in safety at

last to the door of a rambling farmhouse. The sugar orchard covered the side hill away beyond. To reach it we floundered and slipped and slumped along the winding country road till we came where the bars had been taken down and the worn path showed that an ox team had passed that way many times. It was the thing to do to follow it, now up, now down, over hummocks and bowlders and dipping into the snowy hollows, till we were within the sylvan precincts, inhaling the woodsy smells, and the odor of green things down in the root.

The sugar house was as cosey as Thoreau's hut at Walden; a regular hut in the woods, with its two windows looking into the trees, a little lean-to for the firewood, and the door where one could sit and see the sights and hear the voices I had dreamed about as children dream. The rugged tree boles showed gray as far as the eye could reach, and the phantom look of leafless boughs was overhead; the hills, the far valley, the mountains, were all the same with a difference; snow-banks, wet hollows, lush moss and partridge ber-

ries; it was in the woods, and of the woods; rural, far-off, fascinating.

Just then the foreground was occupied by an ox-sled, still holding, bound to it by chains, the barrel which had been drawn about under the trees to receive the sap from the buckets which now hung by their leathern loops empty and silent, for the sap was not running.

The interior was a place for a boy to read *Robinson Crusoe* in, or the old tales of Homer, while he waited and watched, and sat up all night to tend the fire, or to get one's first taste of the *Midsummer Night's Dream;* a place to tell stories in with one's comrades, or play fox-and-geese on the rude board that hung on the wall, or to solve problems and guess riddles, and get a firelight education of a kind not set down in school books, all sorts, odds and ends of wholesome learning, with a good deal of nonsense of the right kind.

There is not a little of the work-a-day about the experience of the sugar-makers out under the maples, but a poetic and picnic side, too, that one cannot afford to miss. And I mean to hold stoutly

by my statement in the beginning; and say that that lone sugar house with its sylvan outlook and its primitive inlook with its various properties, and all we were made welcome to and free of, is a delightful place to go to.

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